



Elo Touchmonitor User Guide

For 15" LCD Desktop
1529L



Revision C

Elo Touchmonitor

User Guide

15" LCD Desktop

1529L

Revision C

P/N 008603

Elo TouchSystems.

1-800-ELOTOUCH
www.elotouch.com

tyco
Electronics



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INTRODUCTION

Product Description

The 1529L is a retail terminal designed to present information to the operator and the customer. The 1529L is available in serial and USB versions or combo touch monitor. The 1529L functionally consists of a 15.0" LCD main display with a touchscreen, a customer display, an optional vacuum fluorescent display (VFD) Customer Display, an optional fingerprint reader, an optional credit card reader, and a 6 port USB (USB version only) Hub. The main display element is a 15.0 inch diagonal XGA resolution (1024 x 768) LCD display. The main display will consist of an LCD Display and touchscreen. Three types of touchscreens can be selected in the 1529L as options. They are AccuTouch, Intellitouch, and carrollTouch and Acoustic Pulse Recognition.

The fingerprint reader translates illuminated images of fingerprints into digital code for further software processing, e.g. enrollment (fingerprint registration) and verification (authentication of registered users). The fingerprint reader uses the SEIR method and CMOS image sensor to capture high contrast, high resolution fingerprint images. A series of algorithms extracts minutiae data from the image, mapping the distinguishing characteristics of fingerprint ridge ends, splits, dots, and arches. To identify or verify a fingerprint, a proprietary matching algorithm compares the extracted minutiae points from the input fingerprint on the optical module to a previously stored sample. The entire matching process takes roughly one second. There is a fingerprint reader available in the USB version of the 1529L.

The credit card reader reads all three stripes on a standard credit card or drivers license. The credit card is read by sliding the credit card, stripe side toward the display through the credit card reader forward or backward. There is a USB credit card reader only. The Hub provides 4 internal USB ports to be used by the credit card reader, the finger-print reader, the touchscreen, and the customer display. The hub also supplies two USB ports to the outside of the back of the 1529L for external use. The hub is only used by the USB version of the 1529L. The 1529L is powered by a universal AC power source or 12 VDC from external power source.

Detailed LCD Display Performance Requirements

15 inch TFT LCDDisplay Panel

Display Format	1024 x 768
Display area 15"	304.1mm(H) x 228mm(V)
Pixel Pitch 15"	0.297mm(H) x 0.297mm(V)
Contrast Ratio	400:1 typical
Brightness	
LCD	350 cd/m ² (Typical)
AccuTouch	287 cd/m ² (Typical)
IntelliTouch	322 cd/m ² (Typical)
CarrollTouch	322 cd/m ² (Typical)
Surface Capacitive	294 cd/m ² (Typical)
Acoustic Pulse Recognition	322 cd/m ² (Typical)
Accutouch Transmission	82% typical
IntelliTouch Transmission	92% typical
IR Touchscreen Transmission	92% typical
Surface Capacitive Transmission	84% typical
Acoustic Pulse Recognition	92% typical
Response Time	Tr=5 msec/Tf=11msec typical(CPT CLAA150XP01P) Tr=4 msec/Tf=12msec typical(AU G150XG01)
Display Color	16.2 million colors, 6 Bit with dithering
Vertical Viewing Angle	Typical Vertical Viewing Angle: 60deg(looking down)/40 deg(lookingup) @ CR>=10
Horizontal Viewing Angle	Typical Vertical Viewing Angle: 60deg(looking down)/60 deg(lookingup) @ CR>=10

Customer Display

The Customer Display is a twenty character two line vacuum fluorescent display (VFD). It consists of a VFD and VFD controller.

Serial Version

Optional Parameters

Characters per row	20
Number of rows	2
Character configuration	5x7 dot matrix
Character Height	9.5mm
Character width	6.2mm
Character configuration	ASCII
Character color	Blue green
MTBF	300,000 hours

Fingerprint Reader

There is a fingerprint reader in the USB version only.

General Description-FDU01B is a PC peripheral FRD (Fingerprint Recognition Device) for USB (Universal Serial Bus) connections.

Specifications

Sensor	SecuGen FOR
Image Capture Speed	600ms/frame
Image Transfer Speed	500Byte/ms
Pixel Resolution	356x292
USB Signaling Type	Full Speed Type

Theory of Operation

The USB host initiates communication with the FDU01 using operation commands (Sensor LED On, Fingerprint Capture Start and Stop). Fingerprint data are then captured by the CMOS sensor at a total image size of 356 x 292 with 8-bit gray level. The image frame transfer speed is 500 bytes/ms. It takes about 600 milliseconds to send one frame of image data over USB protocols. FDU01 uses the SecuGen FOR (Fingerprint Optic Reader).

Sensor Specifications

Sensor	CMOS Image Sensor
Resolution	500dpi
Verifying Time	<1sec
Image Capture Error Rate	<0.1%
Life Time Typically	40,000Hrs

Credit Card Reader

There is a USB credit card reader only. The USB version is available in HID and Keyboard emulation versions. The reader reads all three stripes on a standard credit card or drivers license.

Reference Standards-Conform to applicable standards	International Standards Organization, American National Standards Institute, California Drivers License, American Association of Motor Vehicle Administrators
Message Format	ACCII
Card Speed	3 to 50 IPS
MTBF Electronics	125,000 hrs; Head 1,000,000 passes

Six Port USB Hub

The Hub provides 4 internal USB ports to be used by the credit card reader, the fingerprint reader, the touchscreen, and the customer display. The hub also supplies two USB ports to the outside of the back of the 1529L for external use. The hub is only used by the USB version of the 1529L. The hub meets the following requirements:

Specification

Full compliance with USB specification 1.0, 1.1 and HID Class Definition Rev 1.0.

Hub shall be self powered

Hub shall provide 2 external and 4 internal downstream ports with individual port over current detection, protection and recovery. Supports both Open Host Controller Interface (OHCI) and Universal Host Controller Interface (UHCI).

Supports Suspend and Resume operation.

Bus fault detection and recovery.

External Power Supply

The 1529L shall be powered by a universal AC power source or 12 VDC from external power source. The power supply shall provide the following capability:

AC power: Input voltage 85 to 265 vac

Input frequency 47 to 63hz

DC power: Input voltage 12 vdc

Input line and load regulation +/-2%

INSTALLATION AND SETUP

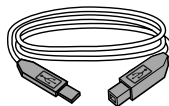
This chapter discusses how to install your LCD touchmonitor and how to install Elo TouchSystems driver software.

Unpacking Your Touchmonitor

Check that the following items are present and in good condition:



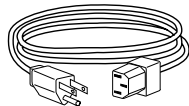
Touchmonitor



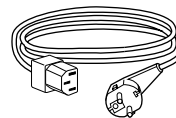
USB Cable



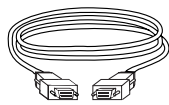
Video cable



Power cable US/Canadian



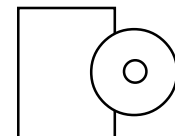
European power cable



DVI cable



Speaker



CD and Quick Install Guide

Product Overview

Main Unit



Note: Shown with optional Biometric & MSR.

Rear View



Note: Shown with optional Rear Facing Customer Display.

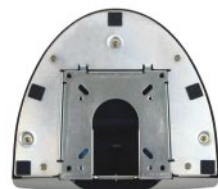
Side View



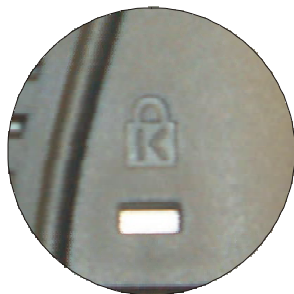
Base Bottom View



or



Kensington™ Lock



The Kensington™ lock is a security device that prevents theft. To find out more about this security device, do to <http://www.kensington.com>.

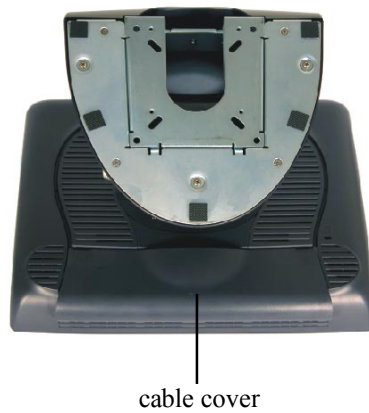
USB Interface Connection

Your touchmonitor comes with only one touchscreen connector cables: **USB** cable. (For Windows 2000, Me and XP systems only.)

To set up the display, please refer to the following figures and procedures:

Remove the Cable Cover

The cables are connected at the back of the monitor.



To remove the cover, grasp the lip of the cover and pull towards you until it snaps off.

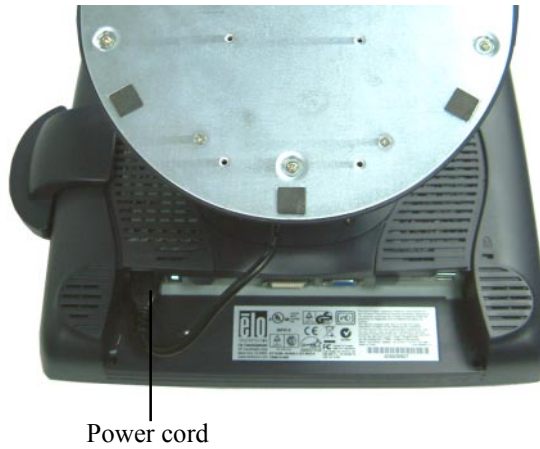
CAUTION

Before connecting the cables to your touchmonitor and PC, be sure that the computer and touchmonitor are turned off.

**NOTE**

Before connecting the cables to the touchmonitor, route all the cables through the hole in the second as shown in the picture above.

The following illustrations guide you step by step in connecting your touchmonitor using a USB cable connection.



Connect one end of the **power cord** to the monitor and the other end to wall.
Connect the power cable to the power port in the monitor.



Video cable

Connect one end of the **video cable** to the rear side of computer and the other to the LCD. Tighten by turning the two thumb screws clockwise to ensure proper grounding. You can select DVI video cable or D-SUB15 video cable.



DVI cable



Speaker cable

Connect one end of the **speaker cable** to the speaker port in the computer and the other end to the port in the monitor.



USB cable

Connect one end of the **USB cable** to the rear side of the computer and the other to the LCD monitor.

The USB cable is for optional touch, MSR, CD and Finger Print Reader. Only one USB cable is needed because the device contains a self powered USB 1.1 Hub. Two self powered ports are available for running other USB devices. For touch only, no USB Hub is present.

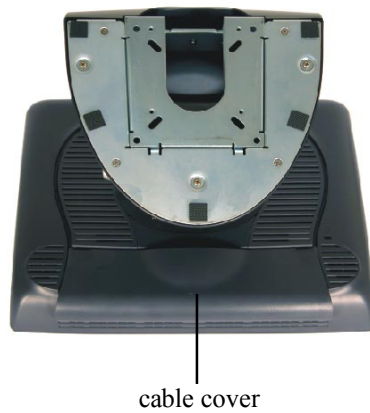
USB / SERIAL Interface Connection

Your touchmonitor comes with only one touchscreen connector cables: **USB** cable. (For Windows 2000, Me and XP systems only.)

To set up the display, please refer to the following figures and procedures:

Remove the Cable Cover

The cables are connected at the back of the monitor.



To remove the cover, grasp the lip of the cover and pull towards you until it snaps off.

CAUTION

Before connecting the cables to your touchmonitor and PC, be sure that the computer and touchmonitor are turned off.

**NOTE**

Before connecting the cables to the touchmonitor, route all the cables through the hole in the second as shown in the picture above.

The following illustrations guide you step by step in connecting your touchmonitor using a USB cable connection.



Power cord

Connect one end of the **power cord** to the monitor and the other end to wall.
Connect the power cable to the power port in the monitor.



Video cable

Connect one end of the **video cable** to the rear side of computer and the other to the LCD. Tighten by turning the two thumb screws clockwise to ensure proper grounding. You can select DVI video cable or D-SUB15 video cable.



DVI cable



Speaker cable

Connect one end of the **speaker cable** to the speaker port in the computer and the other end to the port in the monitor.



USB cable



Serial cable

For USB interface, connect one end of the USB cable to the rear side of the computer and the other to the LCD monitor.

For Serial interface, connect one end of the RS-232 cable to the rear side of the computer and the other to the LCD monitor.

Replace the Cable Cover



Then you have attached all the cables to the monitor, gently bring all the cables toward the standard so they fit under the cover lip.

Snap the Cable cover in place over the connections.

Optimizing the LCD Display

To ensure the LCD display works well with your computer, configure the display mode of your graphic card to make it less than or equal to 1024 x 768 resolution, and make sure the timing of the display mode is compatible with the LCD display. Refer to Appendix A for more information about resolution. Compatible video modes for your touchmonitor are listed in Appendix C.

Installing the Peripheral Device Drivers

Finger Print Reader

NOTE: This driver is for MS Windows 9x through XP.

1 On the TouchTools CD, browse to **Touch Monitor Peripherals\Finger Print Readers\driver\EasyInstall\FDP02**.

2 Double-click *setup.exe*

Follow the Install Shield Wizard procedure to complete the installation.

For a detailed software development kit, browse to **Touch Monitor Peripherals\Finger Print Readers** and open the following files:

- FDxSDKforWindows1 .20.zip
- SecuBSPSDK for Windows2 .10.zip

You will enter one of the following serial numbers depending on your operating system:

- FDx SDK for Windows: 31-100s101-3586383
- FDx SDK for Windows CE: 32-100s101-9713291
- SecuBSP SDK for Windows: 41-100s101-7685871
- SecuBSP SDK for Windows CE: 42-100s101-1155462
- SecuBSP SDK: 51-100s101-5963137

Once the driver setup is complete, the demo program can be run from **Touch Monitor Peripherals\Finger Print Readers\FPR Demo\BSPDemo.exe**

Magnetic Stripe Reader

No device are needed.

Testing the USB MSR Keyboard Emulation

- 1 Plug in the device.
- 2 Open MS Word.
- 3 Slide the card through the MSR to view the data.

Testing the USB-HID Class MSR

- 1 On the CD, browse to **Touch Monitor Peripherals\Magnetic Stripe Card Readers\Demo**.
- 2 Open the **Readme.txt** and follow instructions to test the unit.

Convert MSR from HID to keyboard emulation MSR Conversion:

Get program @ http://www.magtek.com/support/software/demo_programs/usb_swipe_insert_reader.asp

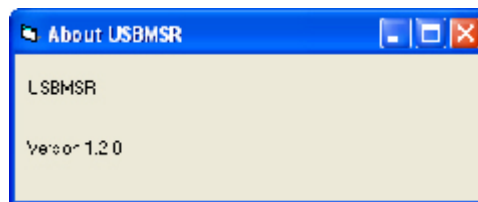
1. To convert from HID to Keyboard Emulation Mode.

- 1.1 Double click on HID MSR Icon in desktop.

The following window will appear

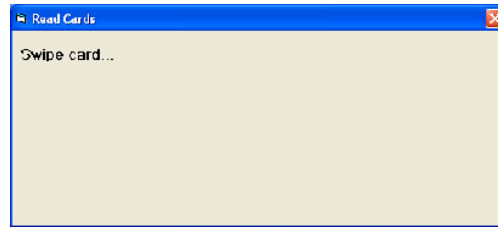


- 1.2 Click on About to verify version

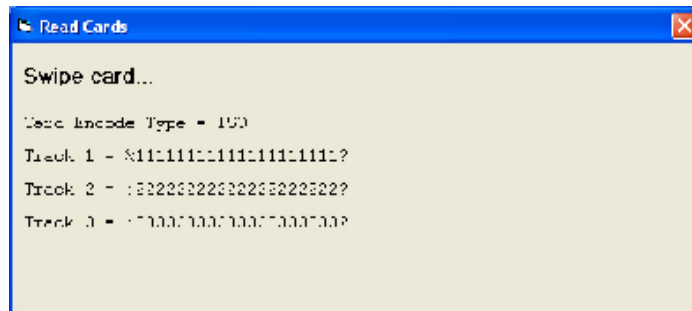


- 1.3 Close About Dialog box.
- 1.4 Click on Read Cards...

1.5 This dialog will appear

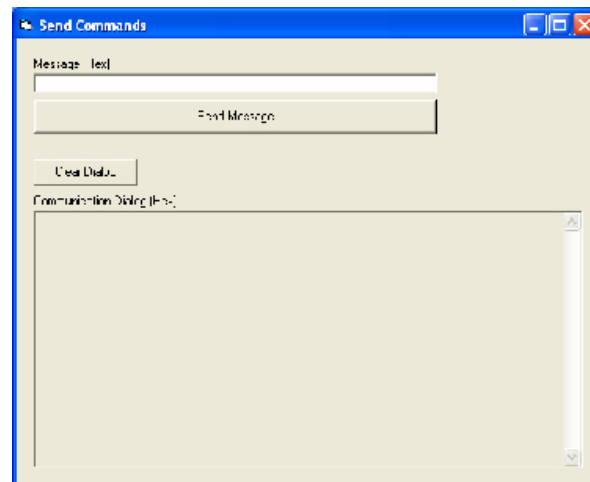


1.6 Swipe Test card.



1.7 Close Read Cards Dialog.

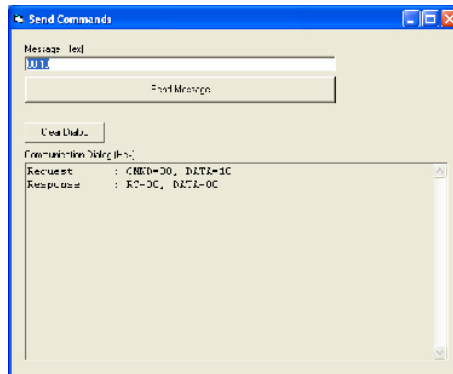
1.8 Click on Send Command. The following dialog box will appear



1.9 To send Inquiry MSR type

1.10 Type 00 10 into area under the heading Message(Hex)

1.11 Then click on Send Message.

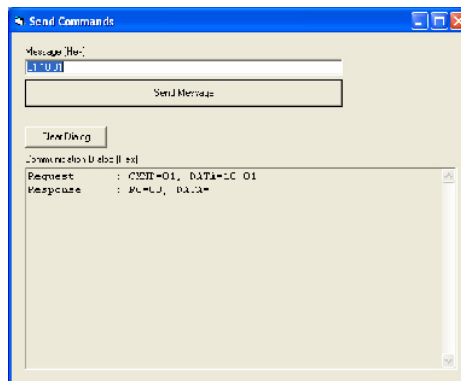


1.12 The DATA=00 means it's USB HID.

1.13 Switch to Keyboard Emulation

1.14 Type 01 10 01 into area under the heading Message(Hex)

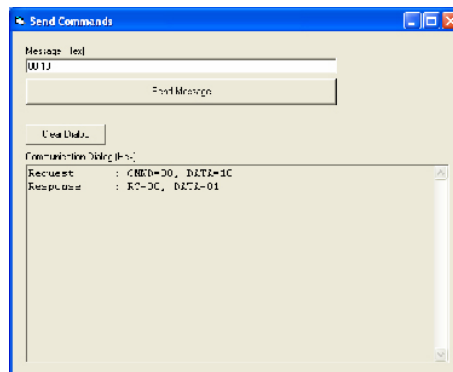
1.15 Then click on Send Message.



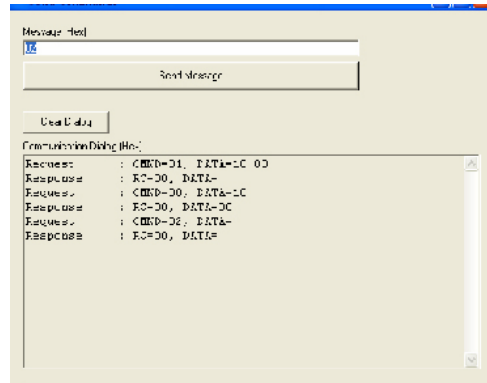
1.16 Send Inquiry MSR type

1.17 Type 00 10 into area under the heading Message(Hex)

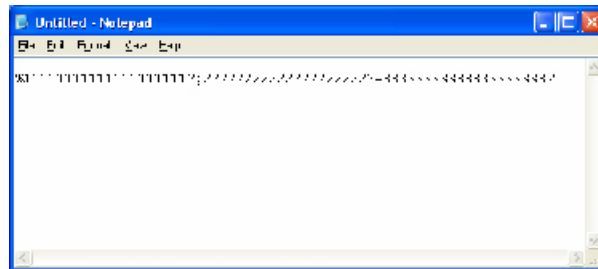
1.18 Then click on Send Message.



- 1.19 The DATA=01 means it's USB Keyboard Emulation.
- 1.20 You must now reset the MSR by sending the command 02.
- 1.21 Type 02 into area under the heading Message(Hex)
- 1.22 Then click on Send Message.



- 1.23 Double click on The KB MSR Test icon in the desktop and slide the test c card.
The following icon will appear



- 1.24 Done.

Convert MSR from keyboard emulation to HID

MSR Conversion:

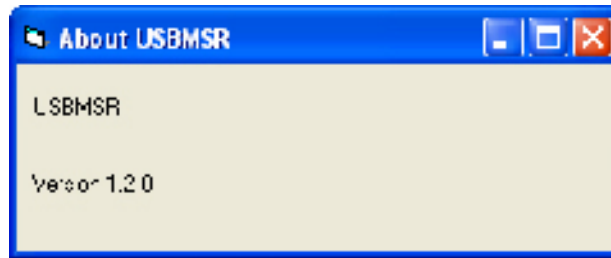
Get program @ http://www.magtek.com/support/software/demo_programs/usb_swipe_insert_reader.asp

1. To convert from Keyboard Emulation to HID Mode.
- 1.1 Double click on HID MSR Icon in desktop.

The following window will appear



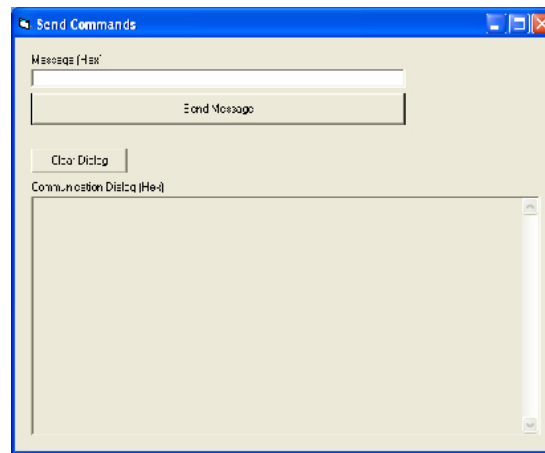
1.2 click on About to verify version



1.3 Close About Dialog.

1.4 Click on Send Commands

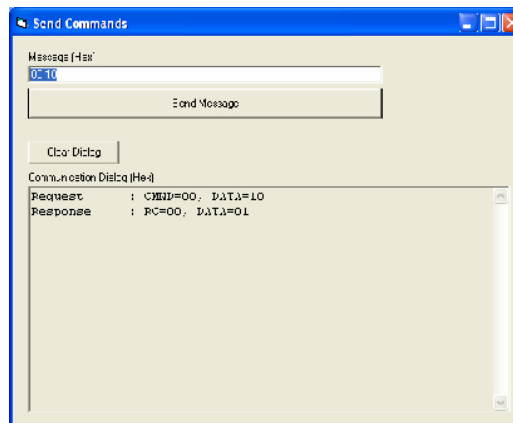
1.5 This Dialog will appear.



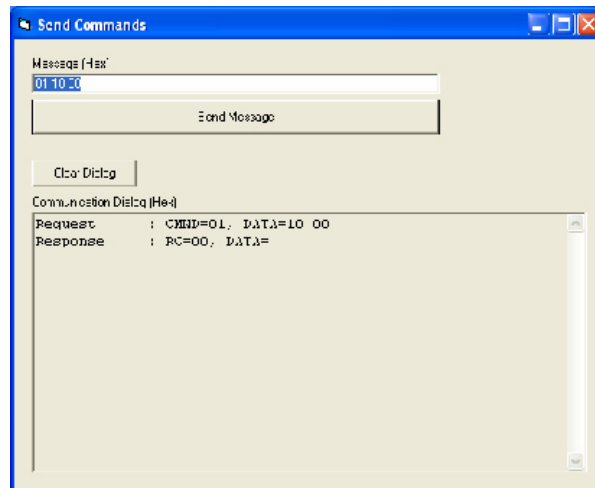
1.6 To send Inquiry MSR type

1.7 Type 00 10 into area under the heading Message(Hex)

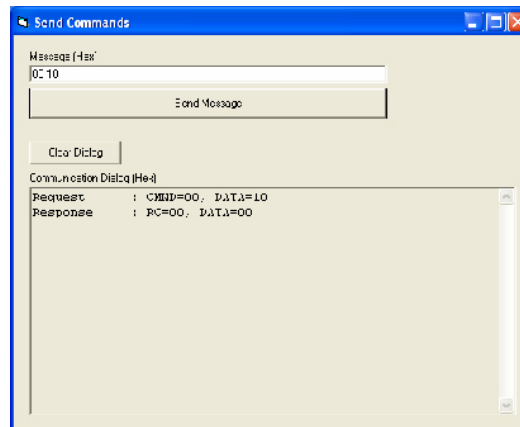
1.8 Then click on Send Message.



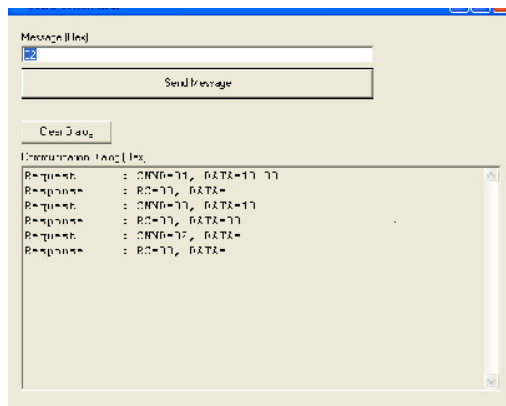
- 1.9 The DATA=01 means it's USB Keyboard Emulation.
- 1.10 Switch to HID
- 1.11 Type 01 10 00 into area under the heading Message(Hex)
- 1.12 Then click on Send Message.



- 1.13 Send Inquiry MSR type
- 1.14 Type 00 10 into area under the heading Message(Hex)
- 1.15 Then click on Send Message.

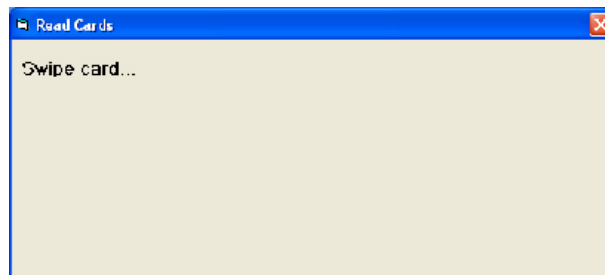


- 1.16 You must now reset the MSR by sending the command 02.
- 1.17 Type 02 into area under the heading Message(Hex)
- 1.18 Then click on Send Message.

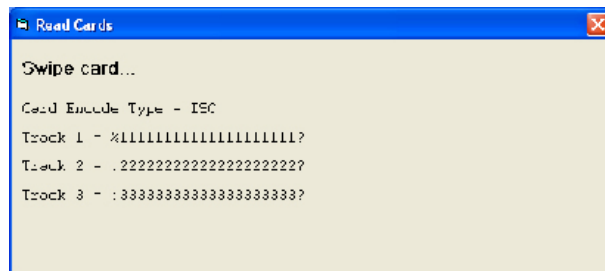


1.19 Click on Read Cards...

1.20 This dialog will appear



1.21 Swipe Test card.



1.22 Close Read Cards Dialog.

1.23 Done.

Rear Facing Customer Display

USB Customer Display

Plug in the USB cable attached to the Customer Display unit. The New Hardware Wizard dialog box will appear.

- 1 Choose **Next** and select “**Search for the best driver for your device (Recommended)**” then choose **Next**.
- 2 When a list of search locations is displayed, place a checkmark on the drive containing the driver package:
Touch Monitor Peripherals\Rear Facing Customer Displays\Drivers\xxx\LCLD9.sys,
where xxx is Win98 for a Windows 98 based system or 2000 for a Windows XP/2000 based system.
- 3 Insert the disk into your drive. (If the driver files have been copied to your hard drive or have been distributed on CD, place a checkmark on “Specify a location” and browse to select the directory containing the driver files.)
- 4 Choose **Next**. Once the Customer Display driver has been detected choose **Next** again.
- 5 Wait while driver files are copied to your computer.
- 6 Insert your Windows CD if prompted and choose **Finish**

To test the drivers:

1 In windows click on **Start > Run**

2 Enter “**cmd**” > **OK**

3 Type “**ECHO ELO>\\.LCLD9**” > **Enter**

The display will show ELO.

Installing the Touch Driver Software

Elo TouchSystems provides driver software that allows your touchmonitor to work with your computer. Drivers are located on the enclosed CD-ROM for the following operating systems:

- Windows XP
- Windows 2000
- Windows Me
- Windows 98
- Windows 95
- Windows NT 4.0
- CE 2.x, 3.0, 4x
- Windows XP Embedded
- Windows 3.x
- MS DOS
- OS/2

Additional drivers and driver information for other operating systems (including Macintosh and Linux) are available on the Elo TouchSystems web site at www.elotouch.com.

Your Elo USB touchmonitor is plug-and-play compliant. Information on the video capabilities of your touchmonitor is sent to your video display adapter when Windows starts. If Windows detects your touchmonitor, follow the instructions on the screen to install a generic plug-and-play monitor.

Refer to the appropriate following section for driver installation instructions.

Installing the USB Touch Driver

Installing the USB Touch Driver for Windows XP, Windows 2000, Me and 98

- 1 Insert the Elo CD-ROM in your computer's CD-ROM drive.
If Windows XP, Windows 2000, Windows 98, or Windows Me starts the Add New Hardware Wizard:
 - 2 Choose **Next**. Select "Search for the best driver for your device (Recommended)" and choose **Next**.
 - 3 When a list of search locations is displayed, place a checkmark on "Specify a location" and use **Browse** to select the \EloUSB directory on the Elo CD-ROM.
 - 4 Choose **Next**. Once the Elo TouchSystems USB touchscreen driver has been detected, choose **Next** again.
 - 5 You will see several files being copied. Insert your Windows 98 CD if prompted. Choose **Finish**.

If Windows XP, Windows 2000, Windows 98, or Windows Me does not start the Add New Hardware Wizard:

NOTE: For Windows XP and Windows 2000 you must have administrator access rights to install the driver.

- 1 Insert the Elo CD-ROM in your computer's CD-ROM drive. If the AutoStart feature for your CD-ROM drive is active, the system automatically detects the CD and starts the setup program.
- 2 Follow the directions on the screen to complete the driver setup for your version of Windows. If the AutoStart feature is not active:
 - 1 Click **Start > Run**.
 - 2 Click the **Browse** button to locate the EloCd.exe program on the CD-ROM.
 - 3 Click **Open**, then **OK** to run EloCd.exe.
 - 4 Follow the directions on the screen to complete the driver setup for your version of Windows.

OPERATION

About Touchmonitor Adjustments

Your touchmonitor will unlikely require adjustment. Variations in video output and application may require adjustments to your touchmonitor to optimize the quality of the display.

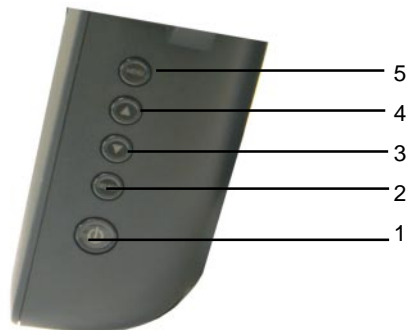
For best performance, your touchmonitor should be operating in native resolution, that is 1024 x 768 at 60-75 Hz. Use the Display control panel in Windows to choose 1024 x 768 resolution.

Operating in other resolutions will degrade video performance. For further information, please refer to Appendix A.

All adjustments you make to the controls are automatically memorized. This feature saves you from having to reset your choices every time you unplug or power your touchmonitor off and on. If there is a power failure your touchmonitor settings will not default to the factory specifications.

To restore factory set up, choose it from the OSD. See page 3-43.

15" LCD Function Key



	Controls	Function
1	Power Switch	Turns the display system power on or off .
2	Select	Displays the OSD menus on the screen and used to select (“Clockwise” and “Counter-clockwise” direction) the OSD control options on the screen.
3	▼	Adjusts the decreasing value of the selected OSD control option.
4	▲	Adjusts the increasing value of the selected OSD control option.
5	Menu	Menu display and menu exit.

Controls and Adjustment

OSD Lock/Unlock

You are able to lock and unlock the OSD feature. The monitor is shipped in the unlocked position.

To lock the OSD:

- 1 Press the Menu button and ▲ button simultaneously for 2 seconds. A window will appear displaying “OSD Unlock”. Continue to hold the buttons down for another 2 seconds and the window toggles to “OSD Lock”.

Power Lock/Unlock

You are able to lock/unlock the Power feature. The monitor is shipped in the unlocked position. To lock the power:

- 1 Press the Menu button and the ▼ simultaneously for 2 seconds. A window for another 2 seconds and the window toggles to —Power Lock“.

OSD Menu Functions

To display the OSD Menu press the **Menu** button.

- 1 Press the ▲ button or ▼ button to select the different OSD control option.
- 2 When the function you want to change is displayed, press the **Select** button.

To adjust the Value of the function:

- 1 Pressing the ▲ button increases the value of the selected OSD control option.
- 2 Pressing the ▼ button decreases the value of the selected OSD control option.

After adjusting the values, the monitor will automatically save the changes.

NOTE: The OSD screen will disappear if no input activities are detected for 45 seconds.

OSD Control Options

Brightness

- Background Luminance of the LCD panel is adjusted.

Contrast

- Adjusts the contrast or the values of color gain (RED, GREEN or BLUE).

Sharpness

- The sharpness can be adjustable.

Phase

- Adjusts the phase of the dot clock.

Auto Adjust

- Clock system auto adjustment (under 5 seconds).

OSD Left/Right

- The OSD screen is moved vertically right and left.

OSD Up/Down

- The OSD screen is moved vertically up and down.

Clock

- Adjusts the ratio of dividing frequency of the dot clock.

Color Temperature

- Sets R, G, B gain.

Current Input

- The frequency of the horizontal/vertical synchronizing signal under the input indicated. (This information is under Auto Adjust icon)

OSD Position

- Allows the OSD indication position to be selected.

Language

- Select the language used for the OSD menu from among English, France, Deutsch, Spanish and Japanese.

Recall Defaults

- All data copy from factory shipment data.

OSD Timeout

- Adjust time for OSD to disappear.

Input Video Select

- Select D-SUB Analog, DVI Digital signal.

Volume

- To increase or decrease the sound level.

Power-Save (No Input)

- The LCD panel background is cut when there is no signal input (AC line power consumption of 4w or less).

Power LED Display & Power Saving

General Power Saving Mode

When the power switch are switch **on**, this LED lights in **green**.

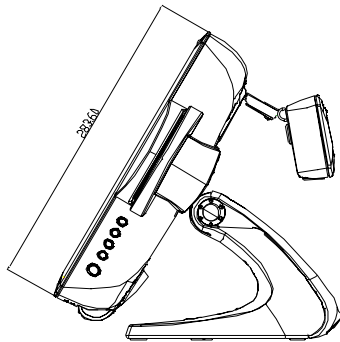
The LED indicates the different power status with altered LED colors when monitor operates in different modes (see following table).

Mode	Power	
	Consumption	Indicator
On	50w max.	Green
Sleep	4w max.	Orange
Off	2w	NO

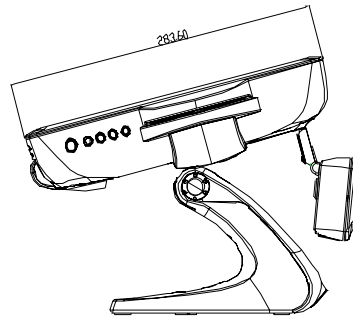
We recommend switching the monitor off when it is not in use for a long period of time.

Display Angle

For viewing clarity, you can tilt the LCD forward up 67 to 90 degrees.



Tilt 30° from vertical



Tilt 75° from vertical

CAUTION

In order to protect the LCD, be sure to hold the base when adjusting the LCD, and take care not to touch the screen.

Controls and Adjustment

OSD Lock/Unlock

You are able to lock and unlock the OSD feature. The monitor is shipped in the unlocked position.

To lock the OSD:

- 1 Press the Menu button and ▲ button simultaneously for 2 seconds. A window will appear displaying “OSD Unlock”. Continue to hold the buttons down for another 2 seconds and the window toggles to “OSD Lock”.

Power Lock/Unlock

You are able to lock/unlock the Power feature. The monitor is shipped in the unlocked position. To lock the power:

- 1 Press the Menu button and the ▼ simultaneously for 2 seconds. A window for another 2 seconds and the window toggles to —Power Lock“.

OSD Menu Functions

To display the OSD Menu press the **Menu** button.

- 1 Press the ▲ button or ▼ button to select the different OSD control option.
- 2 When the function you want to change is displayed, press the **Select** button.

To adjust the Value of the function:

- 1 Pressing the ▲ button increases the value of the selected OSD control option.
- 2 Pressing the ▼ button decreases the value of the selected OSD control option.

After adjusting the values, the monitor will automatically save the changes.

NOTE: The OSD screen will disappear if no input activities are detected for 45 seconds.

OSD Control Options

Brightness

- Background Luminance of the LCD panel is adjusted

Contrast

- Gain of R, G, and B signal is adjusted.

Sharpness

- The sharpness can be adjustable.

Phase

- The phase of the dot clock is adjusted.

Auto Adjust

- Automatically adjusts the systems dot clock(takes approximately 5 seconds).

OSD Left/Right

- The osd screen is moved horizontally left and right.

OSD Up/Down

- The OSD screen is moved vertically up and down.

Clock

- The ratio of dividing frequency of the dot clock is adjusted.

Color Temperature

- Sets the R, G, and B gains.

Current Input

- The frequency of the horizontal/vertical synchronizing signal under the input is indicated.(These information is under auto Adjust icon)

OSD Position

- The osd indication position can be selected.

Language

- Select the language for the OSD menu from among English, France, Deutsch, Spanish and Japanese.

Recall Defaults

- Restore all original factory defaults.

OSD Timeout

- Adjust how long the OSD menu is displayed.

Input Video Select

- Select D-SUB Analog, dvi Digital signal.

Volume

- To increase or decrease the sound level.

TROUBLESHOOTING

If you are experiencing trouble with your touchmonitor, refer to the following table. If the problem persists, please contact your local dealer or our service center. Elo Technical Support numbers are listed on the last page of this manual.

Solutions to Common Problems

Problem	Suggestion(s)
The monitor does not respond after you turn on the system.	Check that the monitor's Power Switch is on.
Characters on the screen are dim The screen is blank	Turn off the power and check the monitor's power cord and signal cable for proper connection. Refer to the <i>Controls and Adjustments</i> section to adjust the brightness. During operation, the monitor screen may automatically turn off as a result of the Power Saving feature. Press any key to see if the screen reappears.
OSD or power buttons don't work "Out of Range" display	Refer to the <i>Controls and Adjustments</i> section to adjust the brightness. Check to see that they are not locked out. See page 3-33. check to see if the resolution or vertical frequency of your computer is higher than that of the LCD display. Reconfigure the resolution of your computer to make it less than or equal to 1024x768. 1024x768 is optimal. See Appendix A for more information on resolution.
Touch doesn't work	Make sure cable is securely attached at both ends.



NATIVE RESOLUTION

The native resolution of a monitor is the resolution level at which the LCD panel is designed to perform best. For the Elo LCD touchmonitor, the native resolution is 1024 x 768 for the 15.0 inch size. In almost all cases, screen images look best when viewed at their native resolution. You can lower the resolution setting of a monitor but not increase it.

Input Video	15.0" LCD
640 x 480 (VGA)	Transforms input format to 1024 x 768
800 x 600 (SVGA)	Transforms input format to 1024 x 768
1024 x 768(XGA)	Display in Native Resolution

The native resolution of an LCD is the actual number of pixels horizontally in the LCD by the number of pixels vertically in the LCD. LCD resolution is usually represented by the following symbols:

VGA	640 x 480
SVGA	800 x 600
XGA	1024 x 768

As an example, a SVGA resolution LCD panel has 800 pixels horizontally by 600 pixels vertically. Input video is also represented by the same terms. XGA input video has a format of 1024 pixels horizontally by 768 pixels vertically. When the input pixels contained in the video input format match the native resolution of the panel, there is a one to one correspondence of mapping of input video pixels to LCD pixels. As an example, the pixel in column 45 and row 26 of the input video is in column 45 and row 26 of the LCD. For the case when the input video is at a lower or higher resolution than the native resolution of the LCD, the direct correspondence between the video pixels and the LCD pixels is lost. The LCD controller can compute the correspondence between video pixels and LCD pixels using algorithms contained on its controller. The accuracy of the algorithms determines the fidelity of conversion of video pixels to LCD pixels. Poor fidelity conversion can result in artifacts in the LCD displayed image such as varying width characters.

B

TOUCHMONITOR SAFETY

This manual contains information that is important for the proper setup and maintenance of your touchmonitor. Before setting up and powering on your new touchmonitor, read through this manual, especially Chapter 2 (Installation), and Chapter 3 (Operation).

- 1** To reduce the risk of electric shock, follow all safety notices and never open the touchmonitor case.
- 2** Turn off the product before cleaning
- 3** Your new touchmonitor is equipped with a 3-wire, grounding power cord. The power cord plug will only fit into a grounded outlet. Do not attempt to fit the plug into an outlet that has not been configured for this purpose. Do not use a damaged power cord. Use only the power cord that comes with your Elo TouchSystems Touchmonitor. Use of an unauthorized power cord may invalidate your warranty.
- 4** The slots located on the sides and top of the touchmonitor case are for ventilation. Do not block or insert anything inside the ventilation slots.
- 5** It is important that your touchmonitor remains dry. Do not pour liquid into or onto your touchmonitor. If your touchmonitor becomes wet do not attempt to repair it yourself.

Care and Handling of Your Touchmonitor

The following tips will help keep your Elo Entuitive touchmonitor functioning at the optimal level.

- To avoid risk of electric shock, do not disassemble the brick supply or display unit cabinet. The unit is not user serviceable. Remember to unplug the display unit from the power outlet before cleaning.
- Do not use alcohol (methyl, ethyl or isopropyl) or any strong dissolvent. Do not use thinner or benzene, abrasive cleaners or compressed air.
- To clean the display unit cabinet, use a cloth lightly dampened with a mild detergent.
- Avoid getting liquids inside your touchmonitor. If liquid does get inside, have a qualified service technician check it before you power it on again.
- Do not wipe the screen with a cloth or sponge that could scratch the surface.
- To clean the touchscreen, use window or glass cleaner. Put the cleaner on the rag and wipe the touchscreen. *Never* apply the cleaner directly on the touchscreen .





TECHNICAL SPECIFICATIONS

Display Modes

Your Elo Entuitive touchmonitor is compatible with the following standard video modes:

Item	Resolution	Type	H. Scan(KHz)	V. Scan(Hz)	Pol.
1	640X350	VGA	31.469	70.087	+ /
2	720X400	VGA	31.469	70.087	- / +
3	640X480	VGA	31.469	59.940	- /
4	640X480	VESA72	37.861	72.809	- /
5	640X480	VESA75	37.500	75.000	- /
6	800X600	SVGA	35.156	56.250	+ / +
7	800X600	SVGA	37.879	60.317	+ / +
8	800X600	VESA72	48.077	72.188	+ / +
9	800X600	VESA75	46.875	75.000	+ / +
10	1024X768	XGA	48.363	60.004	- / -
11	1024X768	XGA	56.476	70.069	- / -
12	1024X768	VESA75	60.023	75.029	+ / +

Touchmonitor Specifications

Model		1529L
LCD Display		15.0" TFT Active Matrix Panel
Display Size		304.1(H) x 228(V) mm
Pixel Pitch		0.297(H) x 0.297(V) mm
Display Mode		VGA 640 x 350 (70 Hz) VGA 720 x 400 (70 Hz) VGA 640 x 480 (60 / 72 / 75 Hz) SVGA 800 x 600 (56 / 60 / 72 / 75Hz) XGA 1024 x 768 (60 / 70 / 75Hz)
Native		XGA 1024 x 768
Contrast Ratio		400 : 1 (typical)
Brightness		350 cd/m ² with AT 287 cd/m ² , IT 322 cd/m ² , IR 322 cd/m ² , SC 294 cd/m ²
LCD		350 cd/m ² (Typical)
AccuTouch		287 cd/m ² (Typical)
IntelliTouch		322 cd/m ² (Typical)
CarrollTouch		322 cd/m ² (Typical)
Surface Capacitive		294 cd/m ² (Typical)
Acoustic Pulse Recognition		322 cd/m ² (Typical)
Response Time		Tr= 5 msec, Tf= 11 msec typical(CPT CLAA150XP01P) Tr= 4 msec, Tf= 12 msec typical(AU G150XG01)
Display Color		16.2 million color, 6 bit with dithering
Viewing Angle		(L/R)= -60°/+60° (typical), (U/D) -60°/+40° (typical)
Input Signal	VGA Analog Video	R.G.B. Analog 0.7V peak to peak
	Sync	TTL Positive or Negative, Composite Sync, Sync on green
	DVI Video	Digital TMDS Input
Signal Connector		15 Pin D-Sub, DVI-D
Front Control		Power on / off , Menu, ▲ , ▼ , Select
OSD		Contrast, Brightness, H/V-Position, Recall default, Color Temperature, Volume, Sharpnss, Phase, Clock OSD H/V position, OSD Time, Auto Adjust, OSD Language, Input Select
Plug & Play		DDC1 / 2B
Touch Panel (optional)		AccuTouch, IntelliTouch and CarrollTouch, Surface Capacitive, Acoustic Pulse Recognition
Power		Input: AC 85-265V, 47-63Hz, or DC 12V/4A (max.)
Operating Conditions	Temp	0°C ~ 40°C (41°F ~ 95°F)
	Humidity	20% ~ 80% (No Condensation)
		Altitude To 12,000 Feet
Dimensions (HxWxD)		354 x 301 x 285mm
Weight (Net)		20.1lbs., monitor weight 16.2 lbs.
Certifications		UL, C-UL, FCC-A, CE, TUV-GS, VCCI, MPRII, C-TICK

AccuTouch Touchscreen Specifications

Mechanical

Construction

Top: Polyester with outside hard-surface coating with clear or antiglare finish.

Inside: Transparent conductive coating.

Bottom: Glass substrate with uniform resistive coating. Top and bottom layers separated by Elo-patented separator dots.

Positional Accuracy

Standard deviation of error is less than 0.080 in. (2.03 mm). This equates to less than $\pm 1\%$.

Touchpoint Density

More than 100,000 touchpoints/in² (15,500 touchpoints/cm²).

Touch Activation Force

Typically less than 4 ounces (113 grams).

Surface Durability

Meets Taber Abrasion Test (ASTM D1044), CS-10F wheel, 500 g.

Meets pencil hardness 3H.

Expected Life

AccuTouch technology has been operationally tested to greater than

Performance

35 million touches in one location without failure, using a stylus similar to a finger.

Optical

Light Transmission (per ASTM D1003)

Typically 85% at 550-nm wavelength (visible light spectrum).

Visual Resolution

All measurements made using USAF 1951 Resolution Chart, under 30 X magnification, with test unit located approximately 1.5 in. (38 mm) from surface of resolution chart.

Antiglare surface: 6:1 minimum.

Haze (per ASTM D1003)

Antiglare surface: Less than 15%.

Gloss (per ASTM D2457)

Antiglare surface: 90 ± 20 gloss units tested on a hard-coated front surface.

IntelliTouch Touchscreen Specifications

Mechanical

Positional Accuracy	Standard deviation of error is less than 0.080 in. (2.03 mm). Equates to less than $\pm 1\%$.
Touchpoint Density	More than 100,000 touchpoints/in ² (15,500 touchpoints/cm ²).
Touch Activation Force	Typically less than 3 ounces (85 grams).
Surface Durability	Surface durability is that of glass, Mohs' hardness rating of 7.
Expected Life Performance	No known wear-out mechanism, as there are no layers, coatings, or moving parts. IntelliTouch technology has been operationally tested to more than 50 million touches in one location without failure, using a stylus similar to a finger.
Sealing	Unit is sealed to protect against splashed liquids, dirt, and dust.

Optical

Light Transmission (per ASTM D1003)	90%
Visual Resolution	All measurements made using USAF 1951 Resolution Chart, under 30X magnification, with test unit located approximately 1.5 in (38 mm) from surface of resolution chart. Clear surface: Excellent, with no noticeable degradation. Antiglare surface: 6:1 minimum.
Gloss (per ASTM D2457 using a 60-degree gloss meter)	Antiglare surface: Curved: 60 ± 20 gloss units or 75 ± 15 gloss units.

Environmental

Chemical Resistance	The active area of the touchscreen is resistant to all chemicals that do not affect glass, such as: Acetone Toluene Methyl ethyl ketone Isopropyl alcohol Methyl alcohol Ethyl acetate Ammonia-based glass cleaners Gasoline Kerosene Vinegar
Electrostatic Protection (per EN 61 000-4-2, 1995)	Meets Levels 4 (15kV air/8 kV contact discharge)

Infrared Touchscreen Specifications

Mechanical

Input Method

Input Method Finger or gloved hand activation

Electrical

Positional Accuracy

Typical centroid accuracy: 2 mm with 1 mm STD error

Resolution

Touchpoint density is based on controller resolution of 4096 x 4096

Touch Activation Force

No minimum touch activation force is required

Controller

Board: Serial (RS232) or USB 1.1

Optical

Light Transmission

Glass overlay: 90% per ASTM D1003-92

Environmental

Chemical Resistance

Glass overlays: The touch active area of the touchscreen is resistant to chemicals that do not affect glass, such as: acetone, toluene, methyl ethyl ketone, isopropyl alcohol, methyl alcohol, ethyl acetate, ammonia-based glass cleaners, gasoline, kerosene, vinegar. Polycarbonate bezel: around perimeter of display has some sensitivity to hydrocarbons.

Durability

Surface Durability

Glass filter option: Surface durability is that of glass, Mohs' hardness rating of 7.

Acoustic Pulse Recognition Specification

MECHANICAL

Input method Finger, finger nail, gloved hand, or stylus activation

ELECTRICAL

Position accuracy 1% max. error

Resolution accuracy Touchpoint density is based on controller resolution of 4096 x 4096

Touch activation force Typically 2 to 3 ounces (55 to 85 grams)

Controller Board: USB 1.1

OPTICAL

Light transmission 90%+/-5%

ENVIRONMENTAL

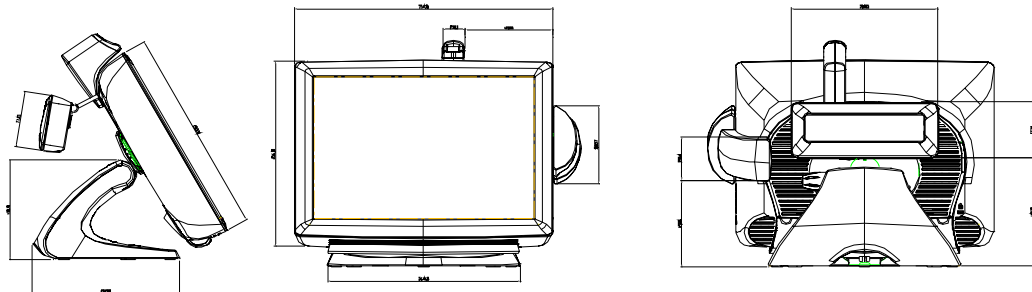
Chemical resistance The touch activation area of the touchscreen is resistant to chemicals that do not affect glass such as: acetone, toluene, methyl ethyl ketone, isopropyl alcohol, methyl alcohol, ethyl acetate, ammonia-based glass cleaners, gasoline, kerosene, vinegar

DURABILITY

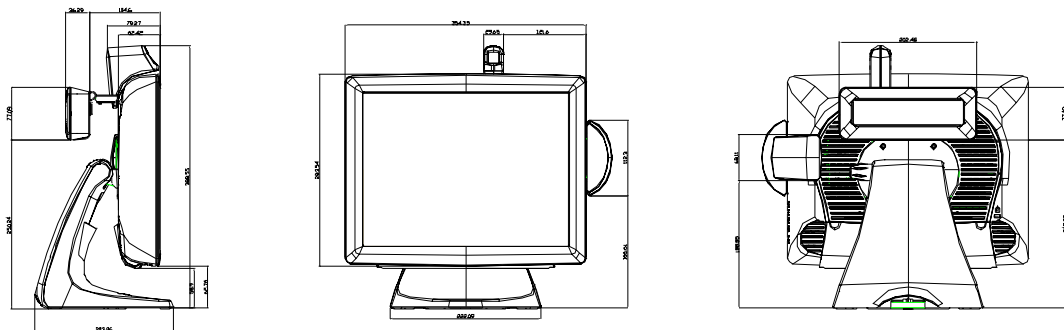
Surface durability Surface durability is that of glass, Mohs' hardness rating of 7

Expected life No known wear-out mechanism, as there are no layers, coatings, or moving parts. APR technology has been operationally tested to more than 50 million touches in one location without failure, using a stylus similar finger.

15" LCD Touchmonitor(ET1529L-XXA-1-XX) Dimensions



15" LCD Touchmonitor(ET1529L-XXA-1-XX-T) Dimensions



REGULATORY INFORMATION

I. Electrical Safety Information:

A) Compliance is required with respect to the voltage, frequency, and current requirements indicated on the manufacturer's label. Connection to a different power source than those specified herein will likely result in improper operation, damage to the equipment or pose a fire hazard if the limitations are not followed.

B) There are no operator serviceable parts inside this equipment. There are hazardous voltages generated by this equipment which constitute a safety hazard. Service should be provided only by a qualified service technician.

C) This equipment is provided with a detachable power cord which has an integral safety ground wire intended for connection to a grounded safety outlet.

1) Do not substitute the cord with other than the provided approved type. Under no circumstances use an adapter plug to connect to a 2-wire outlet as this will defeat the continuity of the grounding wire.

2) The equipment requires the use of the ground wire as a part of the safety certification, modification or misuse can provide a shock hazard that can result in serious injury or death.

3) Contact a qualified electrician or the manufacturer if there are questions about the installation prior to connecting the equipment to mains power.

II. Emissions and Immunity Information

A) Notice to Users in the United States: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

B) Notice to Users in Canada: This equipment complies with the Class B limits for radio noise emissions from digital apparatus as established by the Radio Interference Regulations of Industrie Canada.

C) Notice to Users in the European Union: Use only the provided power cords and interconnecting cabling provided with the equipment. Substitution of provided cords and cabling may compromise electrical safety or CE Mark Certification for emissions or immunity as required by the following standards:

This Information Technology Equipment (ITE) is required to have a CE Mark on the manufacturer's label which means that the equipment has been tested to the following Directives and Standards:

This equipment has been tested to the requirements for the CE Mark as required by EMC Directive 89/336/EEC indicated in European Standard EN 55 022 Class B and the Low Voltage Directive 73/23/EEC as indicated in European Standard EN 60 950.

D) General Information to all Users: This equipment generates, uses and can radiate radio frequency energy. If not installed and used according to this manual the equipment may cause interference with radio and television communications. There is, however, no guarantee that interference will not occur in any particular installation due to site-specific factors.

1) In order to meet emission and immunity requirements, the user must observe the following:

- a) Use only the provided I/O cables to connect this digital device with any computer.
- b) To ensure compliance, use only the provided manufacturer's approved line cord.
- c) The user is cautioned that changes or modifications to the equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

2) If this equipment appears to cause interference with radio or television reception, or any other device:

- a) Verify as an emission source by turning the equipment off and on.
- b) If you determine that this equipment is causing the interference, try to correct the interference by using one or more of the following measures:
 - i) Move the digital device away from the affected receiver.
 - ii) Reposition (turn) the digital device with respect to the affected receiver.
 - iii) Reorient the affected receiver's antenna.
 - iv) Plug the digital device into a different AC outlet so the digital device and the receiver are on different branch circuits.
 - v) Disconnect and remove any I/O cables that the digital device does not use. (Unterminated I/O cables are a potential source of high RF emission levels.)
 - vi) Plug the digital device into only a grounded outlet receptacle. Do not use AC adapter plugs. (Removing or cutting the line cord ground may increase RF emission levels and may also present a lethal shock hazard to the user.)

If you need additional help, consult your dealer, manufacturer, or an experienced radio or television technician.



MPR II

"The application of this monitor is restricted to special controlled luminous environments. The screen surface tends to reflect annoying light of lamps and sunlight. To avoid these reflections the monitor should not be positioned in front of a window or directed to luminaires. The monitor is in compliance with Reflection Class III according to ISO 13406-2"

"Die Anwendung dieses Bildschirms ist auf speziell kontrollierte Umgebungsbeleuchtungen eingeschränkt. Die Bildschirmoberfläche neigt zu störenden Spiegelungen von Lampen und Sonnenlicht. Um diese Reflexionen zu vermeiden sollte der Monitor nicht auf Fenster und Beleuchtungseinrichtungen ausgerichtet sein. Der Monitor erfüllt nur die Reflexionsklasse III nach ISO 13406-2"

This class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.
Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

CAUTION:

Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

VORSICHT:

Explosionsgefahr bei unsachgemäßen Austausch der Batterie. Ersatz nur durch denselben oder einem vom Hersteller empfohlenem ähnlichen Typ. Entsorgung gebrauchter Batterien nach Angaben des Herstellers.

WARRANTY

Except as otherwise stated herein or in an order acknowledgment delivered to Buyer, Seller warrants to Buyer that the Product shall be free of defects in materials and workmanship. With the exception of the negotiated warranty periods; the warranty for the touchmonitor and components of the product is 2 years.

Seller makes no warranty regarding the model life of components. Seller's suppliers may at any time and from time to time make changes in the components delivered as Products or components.

Buyer shall notify Seller in writing promptly (and in no case later than thirty (30) days after discovery) of the failure of any Product to conform to the warranty set forth above; shall describe in commercially reasonable detail in such notice the symptoms associated with such failure; and shall provide to Seller the opportunity to inspect such Products as installed, if possible. The notice must be received by Seller during the Warranty Period for such product, unless otherwise directed in writing by the Seller. Within thirty (30) days after submitting such notice, Buyer shall package the allegedly defective Product in its original shipping carton(s) or a functional equivalent and shall ship to Seller at Buyer's expense and risk.

Within a reasonable time after receipt of the allegedly defective Product and verification by Seller that the Product fails to meet the warranty set forth above, Seller shall correct such failure by, at Seller's options, either (i) modifying or repairing the Product or (ii) replacing the Product. Such modification, repair, or replacement and the return shipment of the Product with minimum insurance to Buyer shall be at Seller's expense. Buyer shall bear the risk of loss or damage in transit, and may insure the Product. Buyer shall reimburse Seller for transportation cost incurred for Product returned but not found by Seller to be defective. Modification or repair, of Products may, at Seller's option, take place either at Seller's facilities or at Buyer's premises. If Seller is unable to modify, repair, or replace a Product to conform to the warranty set forth above, then Seller shall, at Seller's option, either refund to Buyer or credit to Buyer's account the purchase price of the Product less depreciation calculated on a straight-line basis over Seller's stated Warranty Period.

THESE REMEDIES SHALL BE THE BUYER'S EXCLUSIVE REMEDIES FOR BREACH OF WARRANTY. EXCEPT FOR THE EXPRESS WARRANTY SET FORTH ABOVE, SELLER GRANTS NO OTHER WARRANTIES, EXPRESS OR IMPLIED BY STATUTE OR OTHERWISE, REGARDING THE PRODUCTS, THEIR FITNESS FOR ANY PURPOSE, THEIR QUALITY, THEIR MERCHANTABILITY, THEIR NONINFRINGEMENT, OR OTHERWISE. NO EMPLOYEE OF SELLER OR ANY OTHER PARTY IS AUTHORIZED TO MAKE ANY WARRANTY FOR THE GOODS OTHER THAN THE WARRANTY SET FORTH HEREIN. SELLER'S LIABILITY UNDER THE WARRANTY SHALL BE LIMITED TO A REFUND OF THE PURCHASE PRICE OF THE PRODUCT. IN NO EVENT SHALL SELLER BE LIABLE FOR THE COST OF PROCUREMENT OR INSTALLATION OF SUBSTITUTE GOODS BY BUYER OR FOR ANY SPECIAL, CONSEQUENTIAL, INDIRECT, OR INCIDENTAL DAMAGES.

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Electronics



Recommended Disassembly Sequence

LCD Touchmonitor /1529L



Seat Assembly→Enclosure Assembly A→PCB Board / Protection
Cover Assembly→Rear Frame Assembly→Front Frame Assembly
→LCD Assembly→Backlight Module



Power Cord A



Power Cord B



DVI CORD



Compact Disc



VGA Cord



Serial Cord



Audio Cord



USB Cord

USB INTELLIHEAD FOR SWIPE READERS TECHNICAL REFERENCE MANUAL

Manual Part Number 99875320-1P

OCTOBER 2004

PRELIMINARY

MAGTEK[®]

REGISTERED TO ISO 9001:2000

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REVISIONS

Rev Number	Date	Notes
1	XX Oct 04	Initial Release

Limited Warranty

MagTek, Inc. warrants that the Product described in this document is free of defects in materials and workmanship for a period of one year from the date of purchase where the date of purchase is defined as the date of shipment from MagTek. During this warranty period, MagTek shall, at their option, repair or replace without charge for either parts or labor, any failure, malfunction, defect or nonconformity which prevents the product from performing in accordance with MagTek's published technical specifications and manuals.

This warranty does not apply to wear of the magnetic read head. This warranty shall not apply if the product is modified, tampered with, or subject to abnormal working conditions. This warranty does not apply when the malfunction results from the use of the Product in conjunction with ancillary or peripheral equipment where it is determined by MagTek that there is no fault in the Product itself.

Notification by the Customer to MagTek of any condition described above should be directed to the Customer's MagTek Sales Representative or to MagTek's Help Desk at (651) 415-6800. If the Product is to be returned from the Customer to MagTek, a returned material authorization (RMA) will be issued by MagTek. The Customer shall be responsible for shipping charges to MagTek, (20801 S. Annalee Ave., Carson, CA 90746). MagTek shall be responsible for shipping charges back to the Customer.

Repair or replacement as provided under this warranty is the exclusive remedy. This warranty is in lieu of all other warranties, express or implied.

FCC WARNING STATEMENT

This equipment has been tested and found to comply with the limits for Class B digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

FCC COMPLIANCE STATEMENT

This device complies with Part 15 of the FCC Rules. Operation of this device is subject to the following two conditions: (1) This device may not cause harmful interference; and (2) this device must accept any interference received, including interference that may cause undesired operation.

CANADIAN DOC STATEMENT

This digital apparatus does not exceed the Class B limits for radio noise for digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe B prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

CE STANDARDS

Testing for compliance to CE requirements was performed by an independent laboratory. The unit under test was found compliant to Class B.

UL/CSA

This product is recognized per Underwriter Laboratories and Canadian Underwriter Laboratories 1950.

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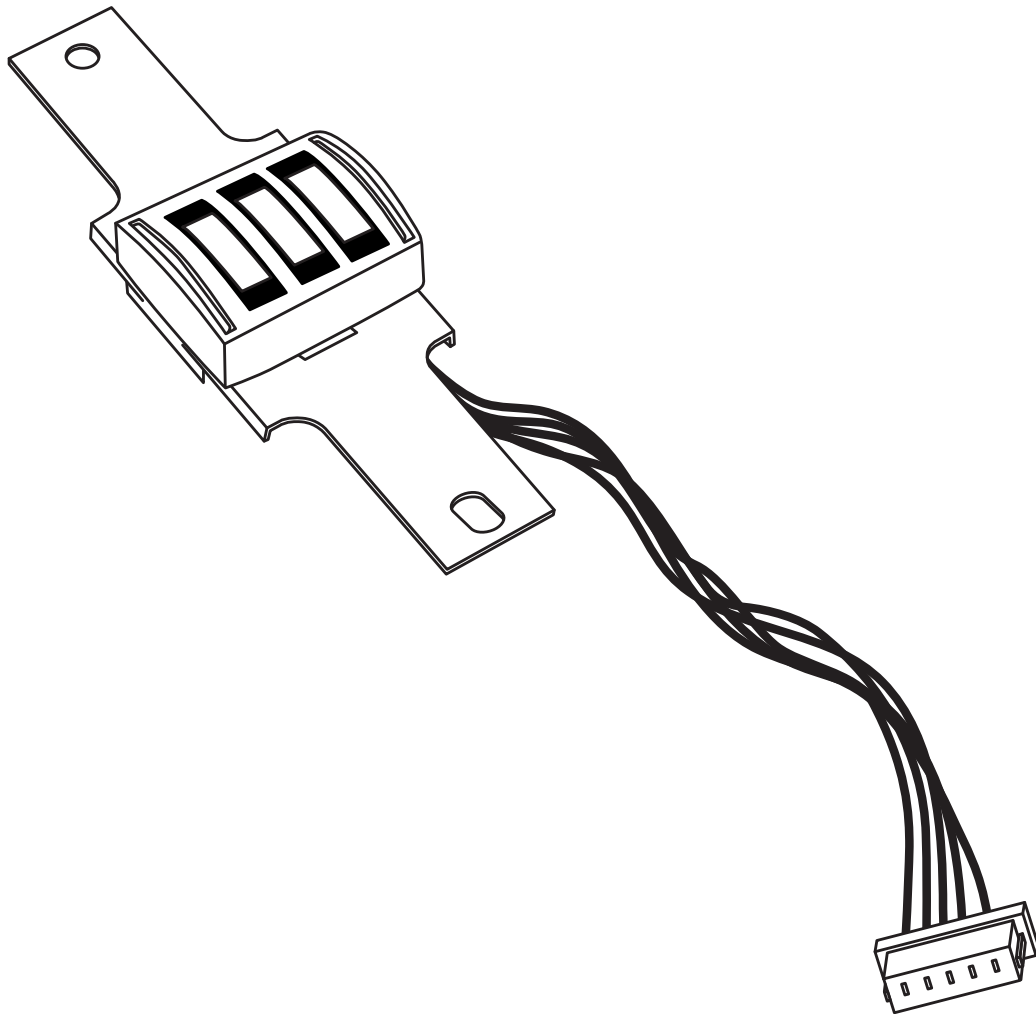


Figure 1-1. 3-Track USB IntelliHead

SECTION 1. FEATURES AND SPECIFICATIONS

The USB (Universal Serial Bus) IntelliHead Swipe Reader is a compact magnetic stripe card reader that conforms to ISO standards. The Reader is compatible with any device with a USB interface. A card is read by sliding it past the head either forward or backward.

The reader conforms to the USB Human Interface Device (HID) Class specification Version 1.1. This allows host applications designed for the latest versions of Windows to easily communicate to the device using standard Windows API calls that communicate to the device through the HID driver that comes with Windows.

Unlike HID keyboard emulation readers, this device does not use keyboard emulation. It behaves like a vendor-defined HID device so that a direct communication path can be established between the Host application and the device without interference such as keystrokes from other HID devices.

A demo program with its source code is available, written in Visual Basic, that exercises the device using the standard Windows API.

FEATURES

Major features of the USB IntelliHead are as follows:

- Powered through the USB – no external power supply required
- Hardware Compatible with PC or any computer or terminal with a USB interface
- Bi-directional card reading
- Reads encoded data that meets ANSI/ISO/AAMVA standards and others such as ISO track 1 format on track 2 or 3.
- Reads up to three tracks of card data
- Compatible with USB specification Revision 1.1
- Compatible with HID specification Version 1.1
- Can use standard Windows HID driver for communications. No third part device driver is required.
- Programmable USB serial number descriptor
- Programmable USB Interrupt In Endpoint polling interval

CONFIGURATIONS

The Configurations are as follows:

Table 1-1. Configurations

Part Number	Description	Cable Length and Connector type	Drawing In
21030006	USB HID IntelliHead 3 tracks	125mm, 5 pin Molex	Appendix A

ACCESSORIES

The accessories are as follows:

Part Number	Description
21042806	USB MSR Demo Program with Source Code (Diskette)
99510026	USB MSR Demo Program with Source Code (WEB)

REFERENCE DOCUMENTS

MagTek *Magnetic Card Reader Design Kit Technical Specification* (99821002)

Axelson, Jan. *USB Complete, Everything You Need to Develop Custom USB Peripherals*, 1999. Lakeview Research, 2209 Winnebago St., Madison WI 53704, 396pp., <http://www.lvr.com>.

USB Human Interface Device (HID) Class Specification Version 1.1.

USB (Universal Serial Bus) Specification, Version 1.1, Copyright© 1998 by Compaq Computer Corporation, Intel Corporation, Microsoft Corporation, NEC Corporation.

USB Implementers Forum, Inc., www.usb.org.

SPECIFICATIONS

Table 1-2 lists the specifications for the USB IntelliHead. Figure 1-2 shows the dimensions for the standard product.

Table 1-1. Specifications

Reference Standards	ISO 7810 and ISO 7811 and AAMVA*
Power Input	5V from USB bus
Recording Method	Two-frequency coherent phase (F2F)
Message Format	ASCII
Card Speed	3 to 50 IPS
MTBF	Electronics: 125,000 hours. Head: 1,000,000 passes

ELECTRICAL

Current Normal Mode Suspend Mode	15mA 200 μ A
--	---------------------

MECHANICAL (STANDARD PRODUCT)

Weight	
Cable length	see table 1-1
Connector	see table 1-1

ENVIRONMENTAL

Temperature	
Operating	-40 °C to +70 °C (-40 °F to 158 °F)
Storage	-40 °C to +70 °C (-40 °F to 158 °F)
Humidity	
Operating	10% to 90% noncondensing
Storage	Up to 90% noncondensing
Altitude	
Operating	0-10,000 ft. (0-3048 m.)
Storage	0-50,000 ft. (0-15240 m.)

* ISO (International

SECTION 2. INSTALLATION

This section describes the cable connection, the Windows Plug and Play Setup, and the physical mounting of the unit.

USB CONNECTION

Since the USB IntelliHead is supplied as an OEM product, the installation and system integration will be unique for each application. The reader module must be attached to an appropriate connector which, in turn, connects to the USB hub. The pin numbers for the 5-pin connector are shown in Figure 2-1.

Pin numbers and signal descriptions for the cable shown in the illustration are listed in Table 2-1.

Table 2-1. 5-Pin Connector

Pin Number	Signal	Cable Color
1	VBUS	Red
2	- Data	White
3	+Data	Green
4	Ground	Black
5	Head Case	Brown

WINDOWS PLUG AND PLAY SETUP

On hosts with the Windows operating system, the first time the device is plugged into a specific USB port, Windows will pop up a dialog box, which will guide you through the process of installing a device driver for the device. After this process is completed once, Windows will no longer request this process as long as the device is plugged into the same USB port. The device driver that Windows will install for this device is the driver used for HID devices and it is part of the Windows operating system. When the dialog box pops up, follow the instructions in the dialog box. Sometimes Windows will find all the files it needs on its own without giving any prompts. Other times Windows will need to know the location of the files it needs. If Windows prompts for the file locations, insert the CD that was used to install Windows on your PC and point Windows to the root directory of the CD. Windows should find all the files it needs there.

MOUNTING

Refer to the appropriate Appendix in this document and/or to the *Magnetic Card Reader Design Kit* for complete mounting details.

SECTION 3. OPERATION

CARD READ

A card may be swiped past the read head at any time. The magnetic stripe must face toward the head and may be swiped in either direction. If there is data encoded on the card, the device will attempt to decode the data and then send the results to the host via a USB HID input report. After the results are sent to the host, the device will be ready to read the next card.

SECTION 4. USB COMMUNICATIONS

This device conforms to the USB specification revision 1.1. This device also conforms with the Human Interface Device (HID) class specification version 1.1. The device communicates to the host as a vendor-defined HID device. The details about how the card data and commands are structured into HID reports follow later in this section. The latest versions of the Windows operating systems come with a standard Windows USB HID driver. Windows applications that communicate to this device can be easily developed. These applications can communicate to the device using standard windows API calls that communicate to the device using the standard Windows USB HID driver. These applications can be easily developed using compilers such as Microsoft's Visual Basic or Visual C++. A demonstration program and its source code, written in Visual Basic, that communicates with this device is available. This demo program can be used to test the device and it can be used as a guide for developing other applications. More details about the demo program follow later in this document.

It is strongly recommended that application software developers become familiar with the HID specification the USB specification before attempting to communicate with this device. This document assumes that the reader is familiar with these specifications. These specifications can be downloaded free from www.usb.org.

This is a full speed USB device. This device has a number of programmable configuration properties. These properties are stored in non-volatile EEPROM memory. These properties can be configured at the factory or by the end user. The device has an adjustable endpoint descriptor polling interval value that can be set to any value in the range of 1ms to 255ms. This property can be used to speed up or slow down the card data transfer rate. The device also has an adjustable serial number descriptor. More details about these properties can be found later in this document in the command section.

The device will go into suspend mode when directed to do so by the host. The device will wakeup from suspend mode when directed to do so by the host. The device does not support remote wakeup.

This device is powered from the USB bus. Its vendor ID is 0x0801 and its product ID is 0x0002.

HID USAGES

HID devices send data in reports. Elements of data in a report are identified by unique identifiers called usages. The structure of the device's reports and the device's capabilities are reported to the host in a report descriptor. The host usually gets the report descriptor only once, right after the device is plugged in. The report descriptor usages identify the devices capabilities and report structures. For example, a device could be identified as a keyboard by analyzing the device's report descriptor. Usages are four byte integers. The most significant two bytes are called the usage page and the least significant two bytes are called usage IDs. Usages that are related can share a common usage page. Usages can be standardized or they can be vendor defined. Standardized usages such as usages for mice and keyboards can be found in the HID Usage Tables document and can be downloaded free at www.usb.org. Vendor-defined usages must have a usage page in the range 0xff00 – 0xffff. All usages for this device use vendor-defined magnetic stripe reader usage page 0xff00. The usage IDs for this device are defined in the

following table. The usage types are also listed. These usage types are defined in the HID Usage Tables document.

Magnetic Stripe Reader usage page 0xff00:

Usage ID (Hex)	Usage Name	Usage Type	Report Type
1	Decoding reader device	Collection	None
20	Track 1 decode status	Data	Input
21	Track 2 decode status	Data	Input
22	Track 3 decode status	Data	Input
28	Track 1 data length	Data	Input
29	Track 2 data length	Data	Input
2A	Track 3 data length	Data	Input
30	Track 1 data	Data	Input
31	Track 2 data	Data	Input
32	Track 3 data	Data	Input
38	Card encode type	Data	Input
20	Command message	Data	Feature

REPORT DESCRIPTOR

The HID report descriptor is structured as follows:

Item	Value (Hex)
Usage Page (Magnetic Stripe Reader)	06 00 FF
Usage (Decoding reader device)	09 01
Collection (Application)	A1 01
Logical Minimum (0)	15 00
Logical Maximum (255)	26 ff 00
Report Size (8)	75 08
Usage (Track 1 decode status)	09 20
Usage (Track 2 decode status)	09 21
Usage (Track 3 decode status)	09 22
Usage (Track 1 data length)	09 28
Usage (Track 2 data length)	09 29
Usage (Track 3 data length)	09 2A
Usage (Card encode type)	09 38
Report Count (7)	95 07
Input (Data, Variable, Absolute, Bit Field)	81 02
Usage (Track 1 data)	09 30
Report Count (110)	95 6E
Input (Data, Variable, Absolute, Buffered Bytes)	82 02 01
Usage (Track 2 data)	09 31
Report Count (110)	95 6E
Input (Data, Variable, Absolute, Buffered Bytes)	82 02 01
Usage (Track 3 data)	09 32
Report Count (110)	95 6E

Item	Value (Hex)
Input (Data, Variable, Absolute, Buffered Bytes)	82 02 01
Usage (Command message)	09 20
Report Count (24)	95 18
Feature (Data, Variable, Absolute, Buffered Bytes)	B2 02 01
End Collection	C0

CARD DATA

Card data is only sent to the host on the Interrupt In pipe using an Input Report. The device will send only one Input Report per card swipe. If the host requests data from the device when no data is available, the device will send a Nak to the host to indicate that it has nothing to send. When a card is swiped, the Input Report will be sent even if the data is not decodable. The following table shows how the input report is structured.

Offset	Usage Name
0	Track 1 decode status
1	Track 2 decode status
2	Track 3 decode status
3	Track 1 data length
4	Track 2 data length
5	Track 3 data length
6	Card encode type
7 – 116	Track 1 data
117 – 226	Track 2 data
227 - 336	Track 3 data

TRACK 1 DECODE STATUS

Bits	7-1	0
Value	Reserved	Error

This is a one-byte value, which indicates the status of decoding track 1. Bit position zero indicates if there was an error decoding track 1 if the bit is set to one. If it is zero, then no error occurred. If a track has data on it that is not noise, and it is not decodable, then a decode error is indicated. If a decode error is indicated, the corresponding track data length value for the track that has the error will be set to zero and no valid track data will be supplied.

TRACK 2 DECODE STATUS

Bits	7-1	0
Value	Reserved	Error

This is a one-byte value, which indicates the status of decoding track 2. Bit position zero indicates if there was an error decoding track 2 if this bit is set to one. If it is zero, then no error occurred. If a track has data on it that is not noise, and it is not decodable, then a decode error is indicated. If a decode error is indicated, the corresponding track data length value for the track that has the error will be set to zero and no valid track data will be supplied.

TRACK 3 DECODE STATUS

Bits	7-1	0
Value	Reserved	Error

This is a one-byte value, which indicates the status of decoding track 3. Bit position zero indicates if there was an error decoding track 3 if this bit is set to one. If it is zero, then no error occurred. If a track has data on it that is not noise, and it is not decodable, then a decode error is indicated. If a decode error is indicated, the corresponding track data length value for the track that has the error will be set to zero and no valid track data will be supplied.

TRACK 1 DATA LENGTH

This one-byte value indicates how many bytes of decoded card data are in the track 1 data field. This value will be zero if there was no data on the track or if there was an error decoding the track.

TRACK 2 DATA LENGTH

This one-byte value indicates how many bytes of decoded card data are in the track 2 data field. This value will be zero if there was no data on the track or if there was an error decoding the track.

TRACK 3 DATA LENGTH

This one-byte value indicates how many bytes of decoded card data are in the track 3 data field. This value will be zero if there was no data on the track or if there was an error decoding the track.

CARD ENCODE TYPE

This one-byte value indicates the type of encoding that was found on the card. The following table defines the possible values.

Value	Encode Type	Description
0	ISO/ABA	ISO/ABA encode format
1	AAMVA	AAMVA encode format
2	reserved	
3	Blank	The card is blank.
4	Other	The card has a non-standard encode format. For example, ISO/ABA track 1 format on track 2.
5	Undetermined	The card encode type could not be determined because no tracks could be decoded.
6	None	No decode has occurred. This type occurs if no magnetic stripe data has been acquired since the data has been cleared or since the device was powered on. This device only sends an Input report when a card has been swiped so this value will never occur.

TRACK DATA

If decodable track data exists for a given track, it is located in the track data field that corresponds to the track number. The length of each track data field is fixed at 110 bytes, but the length of valid data in each field is determined by the track data length field that corresponds to the track number. Track data located in positions greater than the track data length field indicates are undefined and should be ignored. The HID specification requires that reports be fixed in size, but the number of bytes encoded on a card may vary. Therefore, the Input Report always contains the maximum amount of bytes that can be encoded on the card and the number of valid bytes in each track is indicated by the track data length field. The track data is decoded and converted to ASCII. The track data includes all data starting with the start sentinel and ending with the end sentinel.

TRACK 1 DATA

This field contains the decoded track data for track 1.

TRACK 2 DATA

This field contains the decoded track data for track 2.

TRACK 3 DATA

This field contains the decoded track data for track 3.

COMMANDS

Most host applications do not need to send commands to the device. Most host applications only need to obtain card data from the device as described previously in this section. This section of the manual can be ignored by anyone who does not need to send commands to the device.

Command requests and responses are sent to and received from the device using feature reports. Command requests are sent to the device using the HID class specific request Set_Report. The response to a command is retrieved from the device using the HID class specific request Get_Report. These requests are sent over the default control pipe. When a command request is sent, the device will Nak the Status stage of the Set_Report request until the command is completed. This insures that, as soon as the Set_Report request is completed, the Get_Report request can be sent to get the command response. The usage ID for the command message was shown previously in the Usage Table.

The following table shows how the feature report is structured for command requests:

Offset	Field Name
0	Command Number
1	Data Length
2 – 23	Data

The following table shows how the feature report is structured for command responses.

Offset	Field Name
0	Result Code
1	Data Length
2 – 23	Data

COMMAND NUMBER

This one-byte field contains the value of the requested command number. The following table lists all the existing commands.

Value	Command Number	Description
0	GET_PROPERTY	Gets a property from the device
1	SET_PROPERTY	Sets a property in the device

DATA LENGTH

This one-byte field contains the length of the valid data contained in the Data field.

DATA

This multi-byte field contains command data if any. Note that the length of this field is fixed at 22 bytes. Valid data should be placed in the field starting at offset 2. Any remaining data after the valid data should be set to zero. This entire field must always be set even if there is no valid data. The HID specification requires that Reports be fixed in length. Command data may vary in length. Therefore, the Report should be filled with zeros after the valid data.

RESULT CODE

This one-byte field contains the value of the result code. There are two types of result codes: generic result codes and command-specific result codes. Generic result codes always have the most significant bit set to zero. Generic result codes have the same meaning for all commands and can be used by any command. Command-specific result codes always have the most significant bit set to one. Command-specific result codes are defined by the command that uses them. The same code can have different meanings for different commands. Command-specific result codes are defined in the documentation for the command that uses them. Generic result codes are defined in the following table.

Value	Result Code	Description
0	SUCCESS	The command completed successfully.
1	FAILURE	The command failed.
2	BAD_PARAMETER	The command failed due to a bad parameter or command syntax error.

GET AND SET PROPERTY COMMANDS

The Get Property command gets a property from the device. The Get Property command number is 0.

The Set Property command sets a property in the device. The Set Property command number is 1.

The Get and Set Property command data fields for the requests and responses are structured as follows:

Get Property Request Data:

Data Offset	Value
0	Property ID

Get Property Response Data:

Data Offset	Value
0 – n	Property Value

Set Property Request Data:

Data Offset	Value
0	Property ID
1 – n	Property Value

Set Property Response Data:

None

The result codes for the Get and Set Property commands can be any of the codes list in the generic result code table.

Property ID is a one-byte field that contains a value that identifies the property. The following table lists all the current property ID values:

Value	Property ID	Description
0	SOFTWARE_ID	The device's software identifier
1	SERIAL_NUM	The device's serial number
2	POLLING_INTERVAL	The interrupt pipe's polling interval

The Property Value is a multiple-byte field that contains the value of the property. The number of bytes in this field depends on the type of property and the length of the property. The following table lists all of the property types and describes them.

Property Type	Description
Byte	This is a one-byte value. The valid values depend on the property.
String	This is a multiple-byte ASCII string. Its length can be zero to a maximum length that depends on the property. The value and length of the string does not include a terminating NUL character.

SOFTWARE_ID PROPERTY

Property ID: 0
Property Type: String
Length: Fixed at 11 bytes
Get Property: Yes
Set Property: No
Description: This is an 11-byte read only property that identifies the software part number and version for the device. The first 8 bytes represent the part number and the last 3 bytes represent the version. For example this string might be "21088835A02". Examples follow:

Example Get SOFTWARE_ID property Request (Hex):

Cmd Num	Data Len	Prp ID
00	01	00

Example Get SOFTWARE_ID property Response (Hex):

Result Code	Data Len	Prp Value
00	01	32 31 30 34 32 38 30 34 41 30 32

SERIAL_NUM PROPERTY

Property ID: 1
 Property Type: String
 Length: 0 – 15 bytes
 Get Property: Yes
 Set Property: Yes
 Default Value: The default value is no string with a length of zero.
 Description: The value is an ASCII string that represents the device's serial number. This string can be 0 – 15 bytes long. This property is stored in non-volatile EEPROM memory so it will not change when the unit is power cycled. The value of this property, if any, will be sent to the host when the host requests the USB string descriptor. When this property is changed, the unit must be power cycled to have these changes take effect for the USB descriptor. If a value other than the default value is desired, it can be set by the factory upon request. Examples follow.

Example Set SERIAL_NUM property Request (Hex):

Cmd Num	Data Len	Prp ID	Prp Value
01	04	01	31 32 33

Example Set SERIAL_NUM property Response (Hex):

Result Code	Data Len	Data
00	00	

Example Get SERIAL_NUM property Request (Hex):

Cmd Num	Data Len	Prp ID
00	01	01

Example Get SERIAL_NUM property Response (Hex):

Result Code	Data Len	Prp Value
00	03	31 32 33

POLLING_INTERVAL PROPERTY

Property ID: 2
 Property Type: Byte
 Length: 1 byte
 Get Property: Yes
 Set Property: Yes
 Default Value: 10
 Description: The value is a byte that represents the devices polling interval for the Interrupt In Endpoint. The value can be set in the range of 1 – 255 and has units of milliseconds. The polling interval tells the host how often to poll the device for card data packets. For example, if the polling interval is set to 10, the host will poll the device for card data packets every 10ms. This property can be used to speed up or slow down the time it takes to send card data to the host. The trade-off is that speeding up the card data transfer rate increases the USB bus bandwidth used by the device, and slowing down the card data transfer

rate decreases the USB bus bandwidth used by the device. This property is stored in non-volatile EEPROM memory so it will not change when the unit is power cycled. The value of this property, if any, will be sent to the host when the host requests the device's USB endpoint descriptor. When this property is changed, the unit must be power cycled to have these changes take effect for the USB descriptor. If a value other than the default value is desired, it can be set by the factory upon request. Examples follow:

Example Set POLLING_INTERVAL property Request (Hex):

Cmd Num	Data Len	Prp ID	Prp Value
01	02	02	0A

Example Set POLLING_INTERVAL property Response (Hex):

Result Code	Data Len	Data
00	00	

Example Get POLLING_INTERVAL property Request (Hex):

Cmd Num	Data Len	Prp ID
00	01	02

Example Get POLLING_INTERVAL property Response (Hex):

Result Code	Data Len	Prp Value
00	01	0A

MAX_PACKET_SIZE PROPERTY

Property ID: 3

Property Type: Byte

Length: 1 byte

Get Property: Yes

Set Property: Yes

Default Value: 8

Description: The value is a byte that represents the devices maximum packet size for the Interrupt In Endpoint. The value can be set in the range of 1 – 64 and has units of bytes. The maximum packet size tells the host the maximum size of the Interrupt In Endpoint packets. For example, if the maximum packet size is set to 8, the device will send HID reports in multiple packets of 8 bytes each or less for the last packet of the report. This property can be used to speed up or slow down the time it takes to send card data to the host. Larger packet sizes speed up communications and smaller packet sizes slow down communications. The trade-off is that speeding up the card data transfer rate increases the USB bus bandwidth used by the device, and slowing down the card data transfer rate decreases the USB bus bandwidth used by the device. This property is stored in non-volatile EEPROM memory so it will not change when the unit is power cycled. The value of this property will be sent to the host when the host requests the device's USB endpoint descriptor. When this property is changed, the unit must be power cycled to have these changes take effect for the USB descriptor. If a value other than the default value is desired, it can be set by the factory upon request. Examples follow:

Example Set MAX_PACKET_SIZE property Request (Hex):

Cmd Num	Data Len	Prp ID	Prp Value
---------	----------	--------	-----------

01	02	03	08
----	----	----	----

Example Set MAX_PACKET_SIZE property Response (Hex):

Result Code	Data Len	Data
00	00	

Example Get MAX_PACKET_SIZE property Request (Hex):

Cmd Num	Data Len	Prp ID
00	01	03

Example Get MAX_PACKET_SIZE property Response (Hex):

Result Code	Data Len	Prp Value
00	01	08

INTERFACE_TYPE PROPERTY

Property ID: 16 (10 hex)

Property Type: Byte

Length: 1 byte

Get Property: Yes

Set Property: Yes

Default Value: 0 (HID)

Description: The value is a byte that represents the devices interface type. The value can be set to 0 for the HID interface or to 1 for the keyboard emulation interface. When the value is set to 0 (HID) the device will behave as described in the HID manual. When the value is set to 1 (keyboard emulation) the device will behave as described in the keyboard emulation manual. This property should be the first property changed because it affects which other properties are available. After this property is changed, the device should be power cycled before changing any other properties. This property is stored in non-volatile EEPROM memory so it will persist when the unit is power cycled. When this property is changed, the unit must be power cycled to have these changes take effect. If a value other than the default value is desired, it can be set by the factory upon request. Examples follow:

Example Set INTERFACE_TYPE property Request (Hex):

Cmd Num	Data Len	Prp ID	Prp Value
01	02	10	00

Example Set INTERFACE_TYPE property Response (Hex):

Result Code	Data Len	Data
00	00	

Example Get INTERFACE_TYPE property Request (Hex):

Cmd Num	Data Len	Prp ID
00	01	10

Example Get INTERFACE_TYPE property Response (Hex):

USB IntelliHead Swipe Reader

Result Code	Data Len	Prp Value
00	01	00

SECTION 5. DEMO PROGRAM

The demo program, which is written in Visual Basic, can be used to do the following:

- Read cards from the device and view the card data
- Send command requests to the device and view the command responses
- Guide application developers in their application development by providing examples, in source code, of how to properly communicate with the device using the standard Windows APIs

The part numbers for the demo program can be found in this document in Section 1 under Accessories.

INSTALLATION

To install the demo program, run the setup.exe file and follow the instructions given on the screen.

OPERATION

To operate the demo program perform the following steps:

- Attach the device to a USB port on the host.
- If this is the first time the device has been plugged into the host, then follow the instructions on the screen for installing the Windows HID device driver. This is explained in more detail in the installation section of this document.
- Run the demo program.
- To read cards and view the card data, click on the Read Cards button and swipe a card when prompted to do so.
- When finished reading cards, close the dialog box.
- To send commands to the device, click on the send commands button.
- Enter a command in the Message edit box. All data entered should be in hexadecimal bytes with a space between each byte. Enter the command number followed by the command data if there is any. The application will automatically calculate and send the command data length for you. For example, to send the GET_PROPERTY command for property SOFTWARE_ID enter 00 00.
- Press Enter or click on Send message to send the command and receive the result.
- The command request and the command result will be displayed in the Communications Dialog edit box.
- The Clear Dialog button clears the Communication Dialog edit box.

SOURCE CODE

Source code is included with the demo program. It can be used as a guide for application development. It is described in detail, with comments, to assist developers. The book *USB Complete* by Jan Axelson is also a good guide for application developers, especially the chapter on Human Interface Device Host Applications (see “Reference Documents” in Section 1).

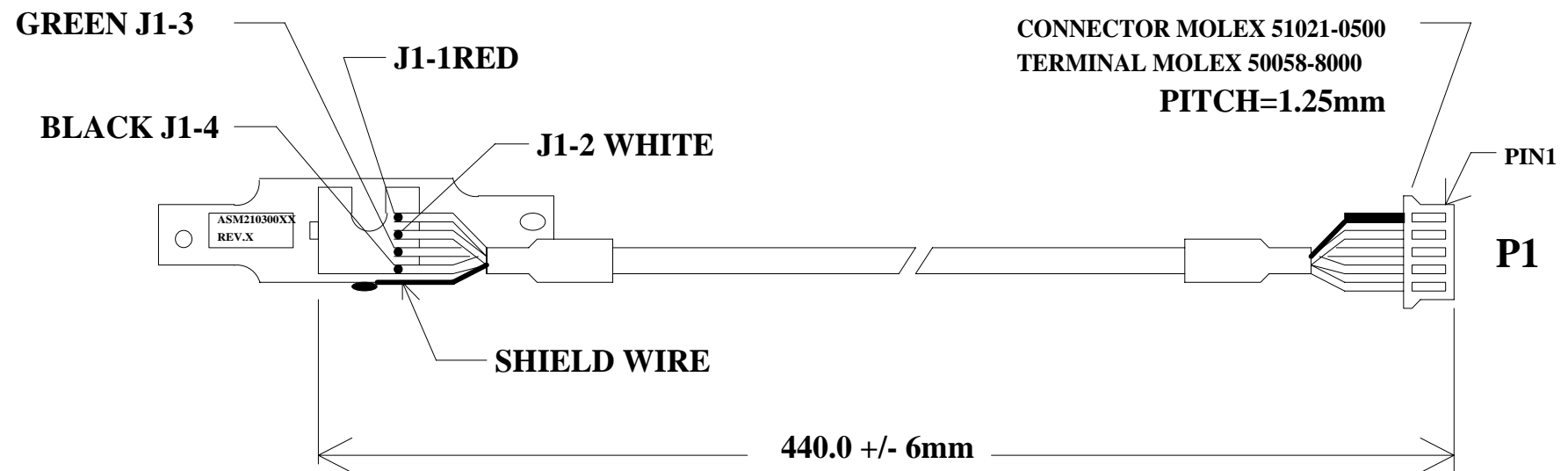
APPENDIX A. USB INTELLIHEAD SWIPE READER

The following drawing is provided in this section:

Part Number	Title
--------------------	--------------

21030006	USB-HID INTHD 3TK 125MM WRE, 5P CONN
----------	--------------------------------------

J1	SIGNAL	COLOR	P1 CONN
1	VBUS	RED	5
2	D -	WHITE	4
3	D +	GREEN	3
4	GND	BLACK	2
	HEAD CASE	SHELD	1



USB HID 3-Track, 440mm Wire, 5PIN Connector

FCC WARNING STATEMENT

This equipment has been tested and found to comply with the limits for Class B digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

FCC COMPLIANCE STATEMENT

This device complies with Part 15 of the FCC Rules. Operation of this device is subject to the following two conditions: (1) This device may not cause harmful interference; and (2) this device must accept any interference received, including interference that may cause undesired operation.

CANADIAN DOC STATEMENT

This digital apparatus does not exceed the Class B limits for radio noise for digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe B prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

CE STANDARDS

Testing for compliance to CE requirements was performed by an independent laboratory. The unit under test was found compliant to Class B.

UL/CSA

This product is recognized per Underwriter Laboratories and Canadian Underwriter Laboratories 1950.

Preliminary to Rev 1 10/20/2004 7:30:02 AM

USB INTELLIHEAD KEYBOARD EMULATION FOR SWIPE READERS TECHNICAL REFERENCE MANUAL

Manual Part Number 99875321-1P

OCTOBER 2004

PRELIMINARY

MAGTEK[®]

REGISTERED TO ISO 9001:2000

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REVISIONS

Rev Number	Date	Notes
1	XX Oct 04	Initial Release

Limited Warranty

MagTek, Inc. warrants that the Product described in this document is free of defects in materials and workmanship for a period of one year from the date of purchase where the date of purchase is defined as the date of shipment from MagTek. During this warranty period, MagTek shall, at their option, repair or replace without charge for either parts or labor, any failure, malfunction, defect or nonconformity which prevents the product from performing in accordance with MagTek's published technical specifications and manuals.

This warranty does not apply to wear of the magnetic read head. This warranty shall not apply if the product is modified, tampered with, or subject to abnormal working conditions. This warranty does not apply when the malfunction results from the use of the Product in conjunction with ancillary or peripheral equipment where it is determined by MagTek that there is no fault in the Product itself.

Notification by the Customer to MagTek of any condition described above should be directed to the Customer's MagTek Sales Representative or to MagTek's Help Desk at (651) 415-6800. If the Product is to be returned from the Customer to MagTek, a returned material authorization (RMA) will be issued by MagTek. The Customer shall be responsible for shipping charges to MagTek, (20801 S. Annalee Ave., Carson, CA 90746). MagTek shall be responsible for shipping charges back to the Customer.

Repair or replacement as provided under this warranty is the exclusive remedy. This warranty is in lieu of all other warranties, express or implied.

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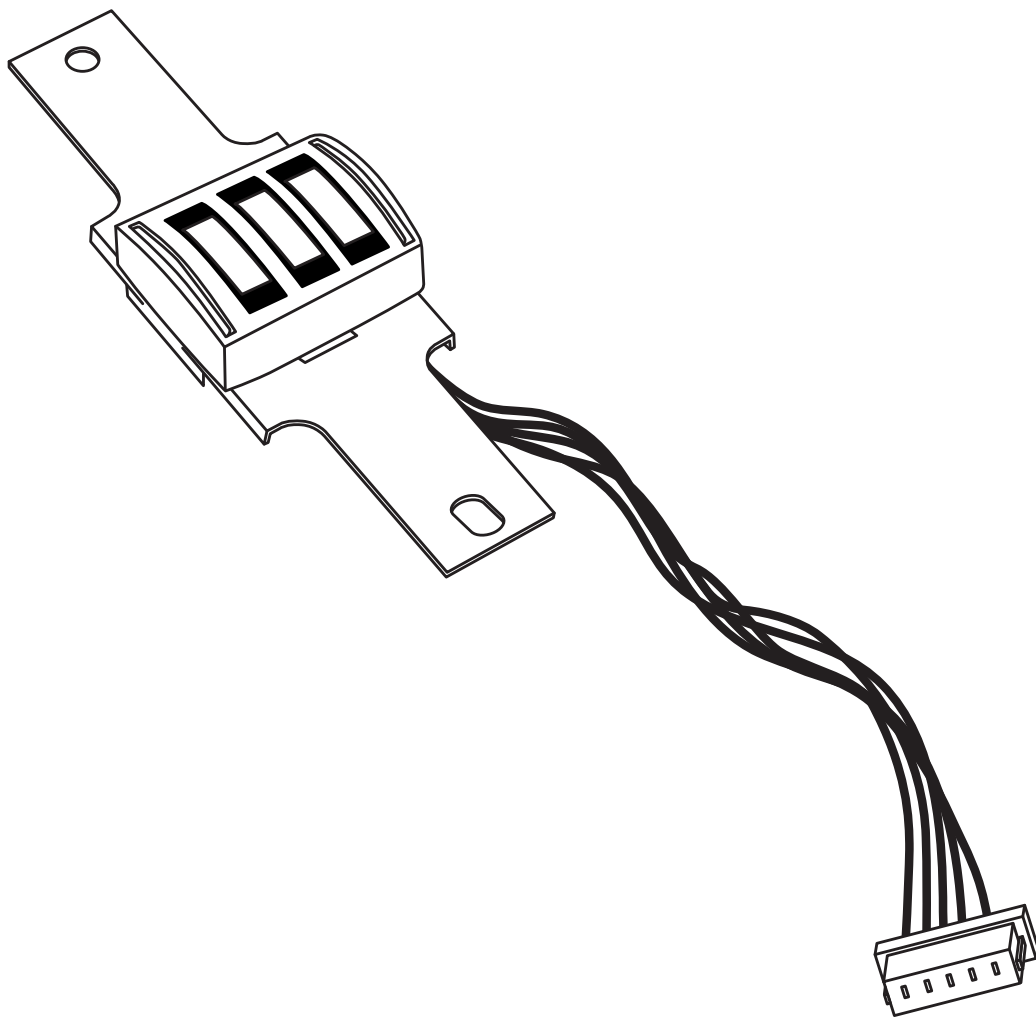


Figure 1-1. 3-Track USB Keyboard Emulation IntelliHead

SECTION 1. FEATURES AND SPECIFICATIONS

The USB (Universal Serial Bus), HID Keyboard Emulation, Swipe Reader is a compact magnetic stripe card reader, which conforms to ISO standards. The Reader is compatible with the PC series of personal computers and emulates the operation of a keyboard. A card is read by sliding it past the head either forward or backward.

The reader emulates a USB Human Interface Device (HID) United States keyboard or optionally all international keyboards using ALT ASCII code keypad key combinations. This allows host applications designed to acquire card data from keyboard input to seamlessly acquire the card data from the USB swipe reader.

Caution

If another keyboard is connected to the same host as this device and a key is pressed on the other keyboard while this device is transmitting, then the data transmitted by this device may get corrupted.

Because of potential "data interleave" issues associated with the USB Keyboard interface, MagTek recommends that the USB Keyboard Emulation MSR product should only be used if the application requires magnetic stripe data to be provided via the keyboard input. If previous applications were based upon RS-232 serial interface MSR's, or if this is a brand new development effort, it is strongly recommended that you use the MagTek's USB IntelliHead product. Please refer to Technical Manual 99875320 for further information regarding the USB IntelliHead.

FEATURES

Major features of the Swipe Reader are as follows:

- Powered through the USB – no external power supply required
- Hardware Compatible with PC or any computer or terminal with a USB interface
- Bidirectional card reading
- Reads encoded data that meets ANSI/ISO/AAMVA standards and others such as ISO track 1 format on track 2 or 3.
- Reads up to three tracks of card data
- Compatible with USB specification Revision 1.1
- Compatible with HID specification Version 1.1
- Can use standard Windows HID drivers for communications. No third part device driver is required.
- Many programmable configuration options
- Non-volatile flash EEPROM memory for configuration storage

HARDWARE CONFIGURATIONS

The hardware configurations are shown in Table 1-1.

Table 1-1. Configurations

Part Number	Description	Cable Length and Connector type	Drawing In
21030007	USB KB IntelliHead 3 tracks	125mm, 5 pin Molex	Appendix A

ACCESSORIES

The accessories are as follows:

Part Number	Description
21042806	USB MSR Demo Program with Source Code (Diskette)
99510026	USB MSR Demo Program with Source Code (WEB)

REFERENCE DOCUMENTS

MagTek *Magnetic Card Reader Design Kit Technical Specification* (99821002)

Axelson, Jan. *USB Complete, Everything You Need to Develop Custom USB Peripherals*, 1999. Lakeview Research, 2209 Winnebago St., Madison WI 53704, 396pp., <http://www.lvr.com>.

USB Human Interface Device (HID) Class Specification Version 1.1.

USB (Universal Serial Bus) Specification, Version 1.1, Copyright 1998 by Compaq Computer Corporation, Intel Corporation, Microsoft Corporation, NEC Corporation.

USB Implementers Forum, Inc., www.usb.org.

SPECIFICATIONS

Table 1-2 lists the specifications for the USB IntelliHead. Figure 1-2 shows the dimensions for the standard product.

Table 1-2. Specifications

Reference Standards	ISO 7810 and ISO 7811 and AAMVA*
Power Input	5V From USB bus
Recording Method	Two-frequency coherent phase (F2F)
Message Format	ASCII
Card Speed	3 to 50 IPS
MTBF	Electronics: 125,000 hours. Head: 1,000,000 passes

ELECTRICAL

Current Normal Mode Suspend Mode	15mA 200 μ A
--	---------------------

MECHANICAL (STANDARD PRODUCT)

Weight	
Cable length	See Table 1-1
Connector	See Table 1-1

ENVIRONMENTAL

Temperature	
Operating	-40 °C to +70 °C (-40 °F to 158 °F)
Storage	-40 °C to +70 °C (-40 °F to 158 °F)
Humidity	
Operating	10% to 90% noncondensing
Storage	Up to 90% noncondensing
Altitude	
Operating	0-10,000 ft. (0-3048 m.)
Storage	0-50,000 ft. (0-15240 m.)

* ISO (International Standards Organization) and AAMVA (American Association of Motor Vehicle Administrators).

SECTION 2. INSTALLATION

This section describes the cable connection, the Windows Plug and Play Setup, and the physical mounting of the unit.

USB CONNECTION

Since the USB IntelliHead is supplied as an OEM product, the installation and system integration will be unique for each application. The reader module must be attached to an appropriate connector which, in turn, connects to the USB hub. The pin numbers for the 5-pin connector are shown in Figure 2-1.

Pin numbers and signal descriptions for the cable shown in the illustration are listed in Table 2-1.

Table 2-1. 5-Pin Connector

Pin Number	Signal	Cable Color
1	VBUS	Red
2	- Data	White
3	+Data	Green
4	Ground	Black
5	Head Case	Brown

WINDOWS PLUG AND PLAY SETUP

On hosts with the Windows operating system, the first time the device is plugged into a specific USB port, Windows will pop up a dialog box, which will guide you through the process of installing a device driver for the device. After this process is completed once, Windows will no longer request this process as long as the device is plugged into the same USB port. The device driver that Windows will install for this device is the driver used for HID keyboard devices and it is part of the Windows operating system. When the dialog box pops up, follow the instructions in the dialog box. Sometimes Windows will find all the files it needs on its own without giving any prompts. Other times Windows will need to know the location of the files it needs. If Windows prompts for the file locations, insert the CD that was used to install Windows on your PC and point Windows to the root directory of the CD. Windows should find all the files it needs there.

MOUNTING

Refer to the appropriate Appendix in this document and/or to the *Magnetic Card Reader Design Kit* for complete mounting details.

SECTION 3. OPERATION

CARD READ

A card may be swiped past the read head at any time. The magnetic stripe must face toward the head and may be swiped in either direction. If there is data encoded on the card, the device will attempt to decode the data and then send the results to the host via a USB HID input report. After the results are sent to the host, the device will be ready to read the next card.

SECTION 4. USB COMMUNICATIONS

This device conforms to the USB specification revision 1.1. This device also conforms with the Human Interface Device (HID) class specification version 1.1. The device communicates to the host as a HID keyboard device. The latest versions of the Windows operating systems come with a standard Windows USB HID keyboard driver.

This is a full speed USB device. This device has a number of programmable configuration properties. These properties are stored in non-volatile EEPROM memory. These properties can be configured at the factory or by the end user. The device has an adjustable endpoint descriptor polling interval value that can be set to any value in the range of 1ms to 255ms. This property can be used to speed up or slow down the card data transfer rate. The device also has an adjustable serial number descriptor. More details about these properties can be found later in this document in the command section.

The device will go into suspend mode when directed to do so by the host. The device will wakeup from suspend mode when directed to do so by the host. The device does not support remote wakeup.

This device is powered from the USB bus. Its vendor ID is 0x0801 and its product ID is 0x0001.

HOST APPLICATIONS

This device can be used with existing applications that acquire card data via keyboard input. Also, applications that communicate to this device can be easily developed. These applications can be developed using compilers such as Microsoft's Visual Basic or Visual C++. To demonstrate this device's card reading capabilities any application that accepts keyboard input such as Window's Notepad can be used.

CARD DATA

The card data is converted to ASCII and transmitted to the host as if it had been typed on a keyboard. Any data with ASCII values 0 – 31 or 127 will be transmitted as their equivalent control code combination. For example a carriage return value 13 (0D hex) will be sent as (^M) where ^ represents the Ctrl key on the keyboard.

Caution

If another keyboard is connected to the same host as this device and a key is pressed on the other keyboard while this device is transmitting, then the data transmitted by this device may get corrupted.

Because of potential "data interleave" issues associated with the USB Keyboard interface, MagTek recommends that the USB Keyboard Emulation MSR product should only be used by customers who have previously used MagTek's Keyboard Wedge MSR, or who are interfacing with an existing PC software application which gathers card data from the keyboard port. If previous applications were based upon RS-232 serial interface MSR's, or if this is a brand new development effort, it is strongly recommended that you use the MagTek's USB IntelliHead

MSR (Non-Keyboard Emulation Version). Please refer to Technical Manual 99875320 for further information regarding the USB IntelliHead HID reader.

The device's programmable configuration options affect the format of the card data.

The card data format for the default configuration is as follows:

[Tk1 SS] [Tk1 Data] [ES] [Tk2 SS] [Tk2 Data] [ES] [Tk3 SS] [Tk3 Data] [ES] [CR]

where:

Tk1 SS	=	% (7-bit start sentinel)
Tk2 SS	=	; (ISO/ABA 5-bit start sentinel)
		@ (7-bit start sentinel)
Tk3 SS	=	+ (ISO/ABA start sentinel)
		# (AAMVA start sentinel)
		& (7-bit start sentinel)
ES	=	? (end sentinel)
CR	=	(carriage return) (0D hex)

All data will be sent in upper case regardless of the state of the caps lock key on the keyboard. If no data is detected on a track then nothing will be transmitted for that track. If an error is detected on a track the ASCII character E will be sent in place of the track data to indicate an error.

The card data format for all programmable configuration options is as follows:

[P11] [P13] [Tk1 SS] [Tk1 Data] [ES] [LRC] [P14] [P5] [P13] [Tk2 SS] [Tk2 Data] [ES]
[LRC] [P14] [P5] [P13] [Tk3 SS] [Tk3 Data] [ES] [LRC] [P14] [P5] [P12]

where:

ES	=	? (end sentinel)
LRC	=	Longitudinal redundancy check character
P5	=	Terminating character
P11	=	Pre card character
P12	=	Post card character
P13	=	Pre track character
P14	=	Post track character
Tk1 SS	=	% (7-bit start sentinel)
Tk2 SS	=	; (ISO/ABA 5-bit start sentinel)
		P6 (7-bit start sentinel)
Tk3 SS	=	P8 (ISO/ABA start sentinel)
		P9 (AAMVA start sentinel)
		P10 (7-bit start sentinel)

All fields with the format P# are programmable configuration property numbers. They are described in detail later in this document.

PROGRAMMABLE CONFIGURATION OPTIONS

This device has a number of programmable configuration properties. These properties are stored in non-volatile EEPROM memory. These properties can be configured at the factory or by the end user using a program supplied by MagTek. Programming these parameters requires low level communications with the device. During normal device operation, the device acts like a USB HID keyboard so the host operating system takes care of all low level communications with the device so that the application developer is not burdened with these low level details. Details on how to communicate with the device to change programmable configuration properties follows in the next few sections. These details are included as a reference only. Most users will not need to know these details because the device will be configured at the factory or by a program supplied by MagTek. Most users may want to skip over the next few sections on low level communications and continue with the details of the configuration properties.

LOW LEVEL COMMUNICATIONS

It is strongly recommended that application software developers become familiar with the HID specification the USB specification before attempting to communicate directly with this device. This document assumes that the reader is familiar with these specifications. These specifications can be downloaded free from www.usb.org.

HID USAGES

HID devices send data in reports. Elements of data in a report are identified by unique identifiers called usages. The structure of the device's reports and the device's capabilities are reported to the host in a report descriptor. The host usually gets the report descriptor only once, right after the device is plugged in. The report descriptor usages identify the devices capabilities and report structures. For example, a device could be identified as a keyboard by analyzing the device's report descriptor. Usages are four byte integers. The most significant two bytes are called the usage page and the least significant two bytes are called usage IDs. Usages that are related can share a common usage page. Usages can be standardized or they can be vendor defined. Standardized usages such as usages for mice and keyboards can be found in the HID Usage Tables document and can be downloaded free at www.usb.org. Vendor defined usages must have a usage page in the range 0xff00 – 0xffff. All usages for this device use the standard HID keyboard usages or vendor defined magnetic stripe reader usage page 0xff00. The vendor defined usage IDs for this device are defined in the following table. The usage types are also listed. These usage types are defined in the HID Usage Tables document.

Magnetic Stripe Reader usage page 0xff00:

Usage ID (Hex)	Usage Name	Usage Type	Report Type
20	Command message	Data	Feature

REPORT DESCRIPTOR

The HID report descriptor is structured as follows:

Item	Value(Hex)
Usage Page (Generic Desktop)	05 01
Usage (Keyboard)	09 06
Collection (Application)	A1 01
Usage Page (Key Codes)	05 07
Usage Minimum (224)	19 E0
Usage Maximum (231)	29 E7
Logical Minimum (0)	15 00
Logical Maximum (1)	25 01
Report Size (1)	75 01
Report Count (8)	95 08
Input (Data, Variable, Absolute)	81 02
Report Count (1)	95 01
Report Size (8)	75 08
Input (Constant)	81 03
Report Count (5)	95 05
Report Size (1)	75 01
Usage Page (LEDs)	05 08
Usage Minimum (1)	19 01
Usage Maximum (5)	29 05
Output (Data, Variable, Absolute)	91 02
Report Count (1)	95 01
Report Size (3)	75 03
Output (Constant)	91 03
Report Count (6)	95 06
Report Size (8)	75 08
Logical Minimum (0)	15 00
Logical Maximum (101)	25 66
Usage Page (Key Codes)	05 07
Usage Minimum (0)	19 00
Usage Maximum (101)	29 66
Input (Data, Array)	81 00
Logical Maximum (255)	26 FF 00
Usage Page (vendor defined (MSR))	06 00 FF
Usage (command data)	09 20
Report Count	95 18
Feature (Data, Variable, Absolute, Buffered Bytes)	B2 02 01
End Collection	C0

COMMANDS

Command requests and responses are sent to and received from the device using feature reports. Command requests are sent to the device using the HID class specific request Set_Report. The response to a command is retrieved from the device using the HID class specific request Get_Report. These requests are sent over the default control pipe. When a command request is sent, the device will Nak the Status stage of the Set_Report request until the command is completed. This insures that as soon as the Set_Report request is completed, the Get_Report request can be sent to get the command response. The usage ID for the command message was shown previously in the Usage Table.

The following table shows how the feature report is structured for command requests:

Offset	Field Name
0	Command Number
1	Data Length
2 – 23	Data

The following table shows how the feature report is structured for command responses.

Offset	Field Name
0	Result Code
1	Data Length
2 – 23	Data

COMMAND NUMBER

This one-byte field contains the value of the requested command number. The following table lists all the existing commands.

Value	Command Number	Description
0	GET_PROPERTY	Gets a property from the device
1	SET_PROPERTY	Sets a property in the device

DATA LENGTH

This one-byte field contains the length of the valid data contained in the Data field.

DATA

This multi-byte field contains command data if any. Note that the length of this field is fixed at 22 bytes. Valid data should be placed in the field starting at offset 2. Any remaining data after the valid data should be set to zero. This entire field must always be set even if there is no valid data. The HID specification requires that Reports be fixed in length. Command data may vary in length. Therefore, the Report should be filled with zeros after the valid data.

RESULT CODE

This one-byte field contains the value of the result code. There are two types of result codes: generic result codes and command-specific result codes. Generic result codes always have the most significant bit set to zero. Generic result codes have the same meaning for all commands and can be used by any command. Command-specific result codes always have the most significant bit set to one. Command-specific result codes are defined by the command that uses them. The same code can have different meanings for different commands. Command-specific result codes are defined in the documentation for the command that uses them. Generic result codes are defined in the following table.

Value	Result Code	Description
0	SUCCESS	The command completed successfully.
1	FAILURE	The command failed.
2	BAD_PARAMETER	The command failed due to a bad parameter or command syntax error.

GET AND SET PROPERTY COMMANDS

The Get Property command gets a property from the device. The Get Property command number is 0.

The Set Property command sets a property in the device. The Set Property command number is 1.

The Get and Set Property command data fields for the requests and responses are structured as follows:

Get Property Request Data:

Data Offset	Value
0	Property ID

Get Property Response Data:

Data Offset	Value
0 – n	Property Value

Set Property Request Data:

Data Offset	Value
0	Property ID
1 – n	Property Value

Set Property Response Data:

None

The result codes for the Get and Set Property commands can be any of the codes list in the generic result code table.

Property ID is a one-byte field that contains a value that identifies the property. The following table lists all the current property ID values:

Value	Property ID	Description
0	SOFTWARE_ID	The device's software identifier
1	SERIAL_NUM	The device's serial number
2	POLLING_INTERVAL	The interrupt pipe's polling interval
3	TRACK_ID_ENABLE	Track enable / ID enable
4	TRACK_DATA_SEND_FLAGS	Track data send flags
5	TERMINATION_CHAR	Terminating char / per track or card flag
6	SS_TK2_7BITS	Start sentinel char for track 2 – 7 bit data
7	Reserved for future use	
8	SS_TK3_ISO_ABA	Start sentinel char for track 3 – ISO/ABA
9	SS_TK3_AAMVA	Start sentinel char for track 3 – AAMVA
10	SS_TK3_7BITS	Start sentinel char for track 3 – 7 bit data
11	PRE_CARD_CHAR	Pre card char
12	POST_CARD_CHAR	Post card char
13	PRE_TK_CHAR	Pre track char
14	POST_TK_CHAR	Post track char

The Property Value is a multiple-byte field that contains the value of the property. The number of bytes in this field depends on the type of property and the length of the property. The following table lists all of the property types and describes them.

Property Type	Description
Byte	This is a one-byte value. The valid values depend on the property.
String	This is a multiple byte ASCII string. Its length can be zero to a maximum length that depends on the property. The value and length of the string does not include a terminating NUL character.

SOFTWARE_ID PROPERTY

Property ID: 0
 Property Type: String
 Length: Fixed at 11 bytes
 Get Property: Yes
 Set Property: No
 Description: This is an 11 byte read only property that identifies the software part number and version for the device. The first 8 bytes represent the part number and the last 3 bytes represent the version. For example this string might be “21088837A05”. Examples follow:

Example Get SOFTWARE_ID property Request (Hex):

Cmd Num	Data Len	Prp ID
00	01	00

Example Get SOFTWARE_ID property Response (Hex):

Result Code	Data Len	Prp Value
00	01	32 31 30 34 32 38 30 32 41 30 35

SERIAL_NUM PROPERTY

Property ID: 1
 Property Type: String
 Length: 0 – 15 bytes
 Get Property: Yes
 Set Property: Yes
 Default Value: The default value is no string with a length of zero.
 Description: The value is an ASCII string that represents the device's serial number. This string can be 0 – 15 bytes long. This property is stored in non-volatile EEPROM memory so it will not change when the unit is power cycled. The value of this property, if any, will be sent to the host when the host requests the USB string descriptor. When this property is changed, the unit must be power cycled to have these changes take effect for the USB descriptor. If a value other than the default value is desired, it can be set by the factory upon request. Examples follow.

Example Set SERIAL_NUM property Request (Hex):

Cmd Num	Data Len	Prp ID	Prp Value
01	04	01	31 32 33

Example Set SERIAL_NUM property Response (Hex):

Result Code	Data Len	Data
00	00	

Example Get SERIAL_NUM property Request (Hex):

Cmd Num	Data Len	Prp ID
00	01	01

Example Get SERIAL_NUM property Response (Hex):

Result Code	Data Len	Prp Value
00	03	31 32 33

POLLING_INTERVAL PROPERTY

Property ID: 2
 Property Type: Byte
 Length: 1 byte
 Get Property: Yes
 Set Property: Yes
 Default Value: 10
 Description: The value is a byte that represents the devices polling interval for the Interrupt In Endpoint. The value can be set in the range of 1 – 255 and has units of milliseconds. The polling interval tells the host how often to poll the device for card data packets. For example, if the polling interval is set to 10, the host will poll the device for card data packets every 10ms. This property can be used to speed up or slow down the time it takes to send card data to the host. The trade-off is that speeding up the card data transfer rate increases the USB

bus bandwidth used by the device, and slowing down the card data transfer rate decreases the USB bus bandwidth used by the device. This property is stored in non-volatile EEPROM memory so it will not change when the unit is power cycled. The value of this property, if any, will be sent to the host when the host requests the device's USB endpoint descriptor. When this property is changed, the unit must be power cycled to have these changes take effect for the USB descriptor. If a value other than the default value is desired, it can be set by the factory upon request. Examples follow:

Example Set POLLING_INTERVAL property Request (Hex):

Cmd Num	Data Len	Prp ID	Prp Value
01	02	02	0A

Example Set POLLING_INTERVAL property Response (Hex):

Result Code	Data Len	Data
00	00	

Example Get POLLING_INTERVAL property Request (Hex):

Cmd Num	Data Len	Prp ID
00	01	02

Example Get POLLING_INTERVAL property Response (Hex):

Result Code	Data Len	Prp Value
00	01	0A

TRACK_ID_ENABLE PROPERTY

Property ID: 3
 Property Type: Byte
 Length: 1 byte
 Get Property: Yes
 Set Property: Yes
 Default Value: 95 (hex)
 Description: This property is defined as follows:

id	0	T ₃	T ₃	T ₂	T ₂	T ₁	T ₁
----	---	----------------	----------------	----------------	----------------	----------------	----------------

Id 0 – Decodes standard ISO/ABA cards only
 1 – Decodes AAMVA, CA DL/ID and 7-bit cards also

T_# 00 – Track Disabled
 01 – Track Enabled
 10 – Track Enabled/Required (Error if blank)

This property is stored in non-volatile EEPROM memory so it will not change when the unit is power cycled. When this property is changed, the unit must be power cycled to have these changes take effect. If a value other than the default value is desired, it can be set by the factory upon request.

TRACK_DATA_SEND_FLAGS PROPERTY

Property ID: 4
 Property Type: Byte
 Length: 1 byte
 Get Property: Yes
 Set Property: Yes
 Default Value: 63 (hex)
 Description: This property is defined as follows:

0	SS	ES	LRC	0	LC	Er	Er
---	----	----	-----	---	----	----	----

SS 0 – Don't send Start Sentinel for each track
 1 – Send Start Sentinel for each track

ES 0 – Don't send End Sentinel for each track
 1 – Send End Sentinel for each track

LRC 0 – Don't send LRC for each track
 1 – Send LRC for each track

Note that the LRC is the unmodified LRC from the track data. To verify the LRC the track data needs to be converted back from ASCII to card data format and the start sentinels that were modified to indicate the card encode type need to be converted back to their original values.

LC 0 – Send card data as upper case
 1 – Send card data as lower case

Note that the state of the Caps Lock key on the host keyboard has no affect on what case the card data is transmitted in.

Er 00 – Don't send any card data if error
 01 – Don't send track data if error
 11 – Send 'E' for each track error

This property is stored in non-volatile EEPROM memory so it will not change when the unit is power cycled. When this property is changed, the unit must be power cycled to have these changes take effect. If a value other than the default value is desired, it can be set by the factory upon request.

TERMINATION_CHAR PROPERTY

Property ID: 5
 Property Type: Byte
 Length: 1 byte
 Get Property: Yes
 Set Property: Yes
 Default Value: 0D (hex) (carriage return)
 Description: This property is defined as follows:

mod	c	c	c	c	c	c	c
-----	---	---	---	---	---	---	---

mod 0 – Send c after card data
 1 – Send c after each track

c 1-127 – 7 bit ASCII char code
 0 – send nothing

This property is stored in non-volatile EEPROM memory so it will not change when the unit is power cycled. When this property is changed, the unit must be power cycled to have these changes take effect. If a value other than the default value is desired, it can be set by the factory upon request.

SS_TK2_7BITS PROPERTY

Property ID: 6
 Property Type: Byte
 Length: 1 byte
 Get Property: Yes
 Set Property: Yes
 Default Value: 40 (hex) '@'
 Description: This character is sent as the track 2 start sentinel for cards that have track 2 encoded in 7 bits per character format. If the value is 0 no character is sent. If the value is in the range 1 – 127 then the equivalent ASCII character will be sent.

This property is stored in non-volatile EEPROM memory so it will not change when the unit is power cycled. When this property is changed, the unit must be power cycled to have these changes take effect. If a value other than the default value is desired, it can be set by the factory upon request.

SS_TK3_ISO_ABA PROPERTY

Property ID:	8
Property Type:	Byte
Length:	1 byte
Get Property:	Yes
Set Property:	Yes
Default Value:	2B (hex) '+'
Description:	This character is sent as the track 3 start sentinel for cards that have track 3 encoded in ISO/ABA format. If the value is 0 no character is sent. If the value is in the range 1 – 127 then the equivalent ASCII character will be sent.

This property is stored in non-volatile EEPROM memory so it will not change when the unit is power cycled. When this property is changed, the unit must be power cycled to have these changes take effect. If a value other than the default value is desired, it can be set by the factory upon request.

SS_TK3_AAMVA PROPERTY

Property ID:	9
Property Type:	Byte
Length:	1 byte
Get Property:	Yes
Set Property:	Yes
Default Value:	23 (hex) '#'
Description:	This character is sent as the track 3 start sentinel for cards that have track 3 encoded in AAMVA format. If the value is 0 no character is sent. If the value is in the range 1 – 127 then the equivalent ASCII character will be sent.

This property is stored in non-volatile EEPROM memory so it will not change when the unit is power cycled. When this property is changed, the unit must be power cycled to have these changes take effect. If a value other than the default value is desired, it can be set by the factory upon request.

SS_TK3_7BITS PROPERTY

Property ID:	10 (0A hex)
Property Type:	Byte
Length:	1 byte
Get Property:	Yes
Set Property:	Yes
Default Value:	26 (hex) '&'
Description:	This character is sent as the track 3 start sentinel for cards that have track 3 encoded in 7 bits per character format. If the value is 0 no character is sent. If the value is in the range 1 – 127 then the equivalent ASCII character will be sent.

This property is stored in non-volatile EEPROM memory so it will not change when the unit is power cycled. When this property is changed, the unit must be power cycled to have these changes take effect. If a value other than the default value is desired, it can be set by the factory upon request.

PRE_CARD_CHAR PROPERTY

Property ID:	11 (0B hex)
Property Type:	Byte
Length:	1 byte
Get Property:	Yes
Set Property:	Yes
Default Value:	0
Description:	This character is sent prior to all other card data. If the value is 0 no character is sent. If the value is in the range 1 – 127 then the equivalent ASCII character will be sent.

This property is stored in non-volatile EEPROM memory so it will not change when the unit is power cycled. When this property is changed, the unit must be power cycled to have these changes take effect. If a value other than the default value is desired, it can be set by the factory upon request.

POST_CARD_CHAR PROPERTY

Property ID:	12 (0C hex)
Property Type:	Byte
Length:	1 byte
Get Property:	Yes
Set Property:	Yes
Default Value:	0
Description:	This character is sent after all other card data. If the value is 0 no character is sent. If the value is in the range 1 – 127 then the equivalent ASCII character will be sent.

This property is stored in non-volatile EEPROM memory so it will not change when the unit is power cycled. When this property is changed, the unit must be power cycled to have these changes take effect. If a value other than the default value is desired, it can be set by the factory upon request.

PRE_TK_CHAR PROPERTY

Property ID:	13 (0D hex)
Property Type:	Byte
Length:	1 byte
Get Property:	Yes
Set Property:	Yes
Default Value:	0
Description:	This character is sent prior to the data for each track. If the value is 0 no character is sent. If the value is in the range 1 – 127 then the equivalent ASCII character will be sent.

This property is stored in non-volatile EEPROM memory so it will not change when the unit is power cycled. When this property is changed, the unit must be power cycled to have these changes take effect. If a value other than the default value is desired, it can be set by the factory upon request.

POST_TK_CHAR PROPERTY

Property ID:	14 (0E hex)
Property Type:	Byte
Length:	1 byte
Get Property:	Yes
Set Property:	Yes
Default Value:	0
Description:	This character is sent after the data for each track. If the value is 0 no character is sent. If the value is in the range 1 – 127 then the equivalent ASCII character be sent.

This property is stored in non-volatile EEPROM memory so it will not change when the unit is power cycled. When this property is changed, the unit must be power cycled to have these changes take effect. If a value other than the default value is desired, it can be set by the factory upon request.

ASCII_TO_KEYPRESS_CONVERSION_TYPE PROPERTY

Property ID:	15 (0F hex)
Property Type:	Byte
Length:	1 byte
Get Property:	Yes
Set Property:	Yes
Default Value:	0 (keymap)
Description:	The value is a byte that represents the devices ASCII to keypress conversion type. The value can be set to 0 for keymap (United states keyboard emulation) or to 1 for ALT ASCII code (international keyboard emulation). When the value is set to 0 (keymap), data will be transmitted to the host

according to a United States keyboard keymap. For example, to transmit the ASCII character '?' (063 decimal), the character is looked up in a keymap. For a United States keyboard keymap, the '/' (forward slash) key combined with the left shift key modifier are stored in the keymap to represent the key press combination that is used to represent the ASCII character '?' (063 decimal). When the value is set to 1 (ALT ASCII code), instead of using the keymap, a international keyboard key press combination consisting of the decimal value of the ASCII character combined with the ALT key modifier is used. For example, to transmit the ASCII character '?' (063 decimal), keypad '0' is sent combined with left ALT key modifier, next keypad '6' is sent combined with the left ALT key modifier, last keypad '3' is sent combined with the left ALT key modifier. In general, if this device only needs to emulate United States keyboards then this property should be set to 0 (keymap). If this device needs to be able to emulate all country's keyboards then this property should be set to 1 (ALT ASCII code). The tradeoffs are as follows. ALT ASCII code mode is slightly slower than keymap mode because more key presses need to be transmitted. Some applications are not compatible with ALT ASCII code mode. This property is stored in non-volatile EEPROM memory so it will persist when the unit is power cycled. When this property is changed, the unit must be power cycled to have these changes take effect. If a value other than the default value is desired, it can be set by the factory upon request. Examples follow:

Example Set INTERFACE_TYPE property Request (Hex):

Cmd Num	Data Len	Prp ID	Prp Value
01	02	0F	00

Example Set INTERFACE_TYPE property Response (Hex):

Result Code	Data Len	Data
00	00	

Example Get INTERFACE_TYPE property Request (Hex):

Cmd Num	Data Len	Prp ID
00	01	0F

Example Get INTERFACE_TYPE property Response (Hex):

Result Code	Data Len	Prp Value
00	01	00

INTERFACE_TYPE PROPERTY

Property ID: 16 (10 hex)
 Property Type: Byte
 Length: 1 byte
 Get Property: Yes
 Set Property: Yes
 Default Value: 1 (keyboard emulation)

Description: The value is a byte that represents the devices interface type. The value can be set to 0 for the HID interface or to 1 for the keyboard emulation interface. When the value is set to 0 (HID) the device will behave as described in the HID manual. When the value is set to 1 (keyboard emulation) the device will behave as described in the keyboard emulation manual. This property should be the first property changed because it affects which other properties are available. After this property is changed, the device should be power cycled before changing any other properties. This property is stored in non-volatile EEPROM memory so it will persist when the unit is power cycled. When this property is changed, the unit must be power cycled to have these changes take effect. If a value other than the default value is desired, it can be set by the factory upon request. Examples follow:

Example Set INTERFACE_TYPE property Request (Hex):

Cmd Num	Data Len	Prp ID	Prp Value
01	02	10	00

Example Set INTERFACE_TYPE property Response (Hex):

Result Code	Data Len	Data
00	00	

Example Get INTERFACE_TYPE property Request (Hex):

Cmd Num	Data Len	Prp ID
00	01	10

Example Get INTERFACE_TYPE property Response (Hex):

Result Code	Data Len	Prp Value
00	01	00

SECTION 5. DEMO PROGRAM

The purpose of this demo program is not to demonstrate card reading with this HID keyboard emulation device. Use a text editor application such as Windows Notepad to demonstrate card reading for this HID keyboard emulation device. Any application that allows user input from a keyboard should be sufficient to demonstrate card reading for this device.

The primary purpose of the demo program, when used with this HID keyboard emulation device, is to allow users to change the device's programmable configuration properties. This is accomplished by sending commands to the device with the demo program. The demo program also comes with source code that can be used as a guide for application developers who want to change the device's programmable configuration properties in an application. However, it is unlikely that application developers will want to change these properties in an application since these properties only need to be set once and can be set at the factory. This program is written in Visual Basic.

Demo programs, version 1.2.0 and newer work on Windows 98, Me, 2000 and XP. Older versions do not support the HID keyboard emulation device on Windows 2000 or XP. These older versions only work on Windows 98 and Me.

When the demo program is run, a button for reading cards is displayed along with a button for sending commands. The card reading option is not supported for this HID keyboard emulation device. Use a text editor application such as Windows Notepad to demonstrate card reading for this HID keyboard emulation device.

The part numbers for the demo program can be found in this document in Section 1 under Accessories.

INSTALLATION

To install the demo program, run the setup.exe file and follow the instructions given on the screen.

OPERATION

To operate the demo program perform the following steps:

- Attach the device to a USB port on the host
- If this is the first time the device has been plugged into the host, then follow the instructions on the screen for installing the Windows HID device driver. This is explained in more detail in the installation section of this document.
- Run the demo program.
- To read cards and view the card data do not use the demo program. Use a text editor program such as Windows Notepad.
- To send commands to the device, click on the send commands button.

- Enter a command in the Message edit box. All data entered should be in hexadecimal bytes with a space between each byte. Enter the command number followed by the command data if there is any. The application will automatically calculate and send the command data length for you. For example, to send the GET_PROPERTY command for property SOFTWARE_ID enter 00 00.
- Press Enter or click on Send message to send the command and receive the result.
- The command request and the command result will be displayed in the Communications Dialog edit box.
- The Clear Dialog button clears the Communication Dialog edit box.

SOURCE CODE

Source code is included with the demo program. It can be used as a guide for application development. It is described in detail, with comments, to assist developers. The book *USB Complete* by Jan Axelson is also a good guide for application developers, especially the chapter on Human Interface Device Host Applications (see “Reference Documents” in Section 1).

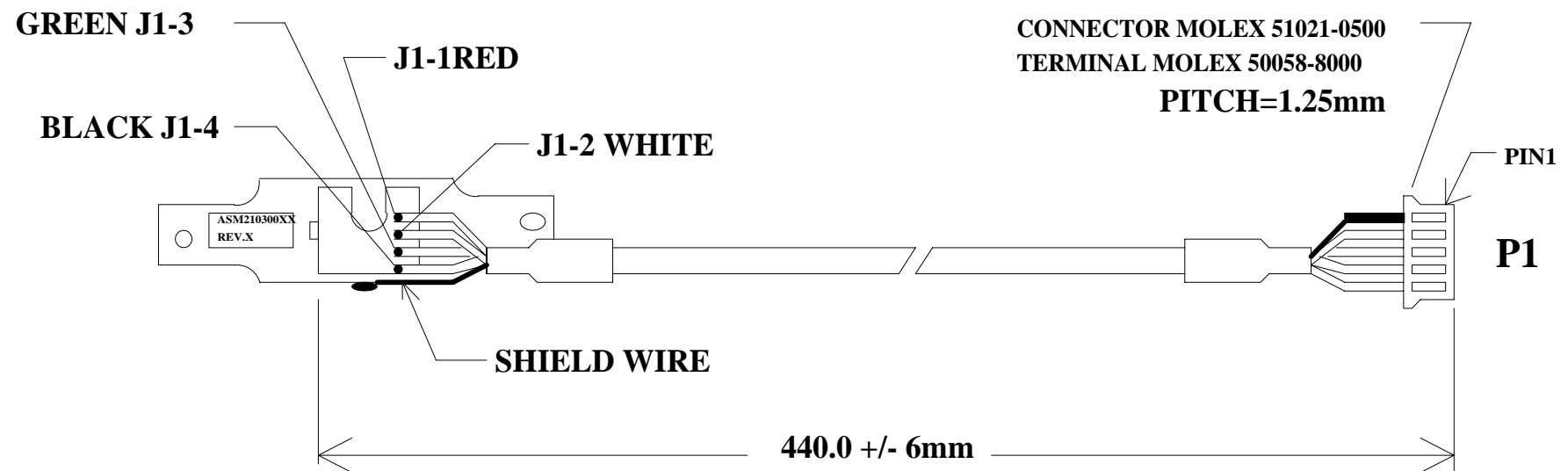
APPENDIX A. USB INTELLIHEAD SWIPE READER

The following drawing is provided in this section:

Part Number	Title
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21030007	USB-KB INTHD 3TK 125MM WRE, 5P CONN
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J1	SIGNAL	COLOR	P1 CONN
1	VBUS	RED	5
2	D -	WHITE	4
3	D +	GREEN	3
4	GND	BLACK	2
	HEAD CASE	SHELD	1



USB HID 3-Track, 440mm Wire, 5PIN Connector

INSTALLATION GUIDE

LD9000U series



USB Interface Customer Pole Displays

LD9000U, LD9200U, LD9300U, LD9400U, LD9500U, LD9900U, LD9000XU, LD9200XU, LD9300XU, LD9400XU, LD9500XU and LD9900XU

HARDWARE INSTALLATION

Your LD9000U family of pole displays has been pre-assembled to make the installation as simple as possible.

1. Mount the pole display to the metal base plate using the mounting hardware provided.
2. The pole display can be used in a freestanding mode or attached to the counter using the remaining mounting hardware.
3. Connect the female phone jack of the power adapter to the power socket from the pole display.
4. Plug the power adapter into a 120VAC power outlet. Display should show a power on start up message.
5. Plug the USB cable from the pole display into the computer's USB port.

DRIVER INSTALLATION

When hardware is installed correctly, Windows will detect the USB pole display and start device driver installation. Insert the driver diskette into floppy disk drive A and follow instructions on screen to install the driver.

There are two types of drivers available. First one use a specific device name (\\.\LCLD9) to access the pole display directly. Select this driver if you are using OPOS or the POS software was tailored to use this device name. If the POS software is only able to access COM ports for the pole display, use the Virtual COM port device driver.

Installing USB Device Name Drivers:

For Windows 98/ME:

1. When Windows tried to search for a driver, specify a location "A:\Win98" and click [Next].
2. Windows will locate the driver "A:\Win98\LCLD9.inf". Click [Next] to install.
3. If Windows prompts for inserting driver disk again, click [OK] to continue and enter "A:\Win98" in the "Copy files from" dialog box. Then click [OK] to continue.
4. When finished copying the drivers, click [Finish].
5. Remove driver disk and reboot computer.
6. Go to "Device Manager" to check that the pole display has been installed correctly under "Universal Serial Bus Controllers" section.

For Windows 2000/XP:

1. When Windows tried to search for a driver, click on the check box "Specify a location " and click [Next]. Enter "A:\Win2000" for the location and click [Next].
2. If Windows indicates that it also found other drivers that are suitable, click on the check box "Install one of the other drivers".
3. Select driver A:\Win2000\LCLD9.inf and click [Next].
4. When finished installing, click [Finish].
5. Go to "Device Manager" to check that the pole display has been installed correctly under "Universal Serial Bus Controllers" section.

Installing Virtual COM Port Device Drivers:

For Windows 98/ME

1. When Windows tried to search for a driver, specify a location "A:\W98com" and click [Next].
2. Windows will locate the driver "A:\LCLD9usb.inf". Click [Next] to install.
3. If Windows prompts for inserting driver disk again, click [OK] to continue and enter "A:\W98com" in the "Copy files from" dialog box. Then click [OK] to continue.
4. When finished copying the drivers, click [Finish].
5. Remove driver disk and reboot computer.
6. Click on [Start] -> [Settings] -> [Control Panel].
7. Click on [Add/Remove Hardware] and then [Next].
8. Windows will search for Plug & Play devices. Click [Next] to continue.
9. When prompted, click on the check box for "No, the device isn't in the list" and click [Next].
10. When prompted again, click on the check box for "No, I want to select the hardware from a list" and click [Next].
11. In the device list, select "Ports (COM & LPT)" and click [Next].
12. Click on [Have Disk] and select "LCI LCLD9 COM Port". Then click [Next].
13. There is no need to change hardware settings. Just click [Next] to continue installation.
14. When finished installing, click [Finish].
15. Remove driver disk and reboot computer.
16. Go to "Device Manager" to check that the pole display has been installed correctly under "Ports (COM & LPT)" section and note down the Port number.

For Windows 2000/XP:

1. When Windows tried to search for a driver, click on the check box "Specify a location " and click [Next]. Enter "A:\W2kCom" for the location and click [Next].
2. If Windows indicates that it also found other drivers that are suitable, click on the check box "Install one of the other drivers".
3. Select driver A:\W2kCom\LD9COM.inf and click [Next].
4. When finished installing, click [Finish].
5. Go to "Device Manager" to check that the pole display has been installed correctly under "Ports (COM & LPT)" section and note down the Port number.

SOFTWARE COMMANDS

Logic Controls pole displays are controlled by command codes and data from the computer. Commands are transmitted to the pole display as ASCII codes. The command codes listed below are expressed in hexadecimal (base 16) numbers enclosed inside angle brackets <>, in decimal numbers enclosed in parenthesis (), and in ASCII characters enclosed in curly brackets { }. Do **not** include the brackets as part of the command. ' ^ ' character denotes 'Ctrl' in the keyboard. Press and hold 'Ctrl', then press the next key.

LOGIC CONTROLS COMMAND SET (LD9000U, LD9000XU):

- Vertical Scroll Mode <12>, (18), {^R}:**
Data is written into the second row and scrolled to the first row when carriage return is received, leaving the second row empty.
- Normal Display Mode <11>, (17), {^Q}:**
Data can be written into either row. Moves to the left most digit of the other row when line is full.
- Brightness Control <04>, (04), {^D}:**
Brightness of the display can be adjusted with this command followed by data byte <FF>, <60> or <20>.
- Back Space <08>, (08), {^H}:**
The cursor position moves one digit to the left erasing the previous information.
- Horizontal Tab <09>, (09), {^I}:**
The cursor position shifts one digit to the right without erasing character at original cursor position.
- Line Feed <0A>, (10), {^J}:**
The cursor position moves to the same position in the other row. In vertical scroll mode, if cursor was in second row, the cursor will not move and display will scroll up.
- Carriage Return <0D>, (13), {^M}:**
The cursor moves to the left most digit of the row it is in.
- Digit Select <10>, (16), {^P}:**
Moves the cursor to any position on the display with this command followed by data byte <00> to <27>.
- Cursor On <13>, (19), {^S}:**
Turns on the cursor.
- Cursor Off <14>, (20), {^T}:**
Turns off the cursor.
- Reset <1F>, (31), {^_}:**
All characters are erased and all settings are returned to the power-on reset conditions.
- Down Load Font <03><X> <F> <F> <F> <F> <F>:**
Assign a keyboard key (ASCII code <20> to <7F>) to a different style font. The "X" represents the ASCII code for the selected key. The "F"s represent the 5 segments that will make up the special font.
- Message Scroll <05><X><X><X> ... <X><0D>:**
Scrolls a continuous message of up to 45 characters from right to left on the top line.
- Message Scroll Left on Bottom Line <1B><06><X><X><X> ... <X><0D>:**
Scrolls a continuous message of up to 45 characters from right to left on the bottom line.
- Message Scroll Right on Top Line <1B><07><X><X><X> ... <X><0D>:**
Scrolls a continuous message of up to 45 characters from left to right on the top line.
- Message Scroll Right on Bottom Line <1B><0B><X><X><X> ... <X><0D>:**
Scrolls a continuous message of up to 45 characters from left to right on the bottom line.
- Both Side Display <1B><0C>, (27)(12), {^[] {^L}:**
After this command, all messages followed are displayed on both sides of double sided displays.
- Front Side Display <1B><0E>, (27)(14), {^[] {^N}:**
After this command, all messages followed are displayed only on front side of double sided displays.
- Back Side Display <1B><0F>, (27)(15), {^[] {^O}:**
After this command, all messages followed are displayed only on back side of double sided displays.
- Clock Display <1B><1A><h><h><3A><m><m>:**
Displays real time clock on bottom line in the 12 hour format hh:mm.
- Smart Message Scroll Left on Top Line <1B><15><X><X><X> ... <1C> ... <1C> ... <X><0D>:**
Scrolls a multi-part message of up to total of 45 characters from right to left on the top line. Message parts are separated by <1C> and each part must be less than 20 characters.
- Smart Message Scroll Left on Bottom Line <1B><16><X><X><X> ... <1C> ... <1C> ... <X><0D>:**
Scrolls a multi-part message from right to left on the bottom line.
- Smart Message Scroll Right on Top Line <1B><13><X><X><X> ... <1C> ... <1C> ... <X><0D>:**
Scrolls a multi-part message from left to right on the top line.
- Smart Message Scroll Right on Bottom Line <1B><14><X><X><X> ... <1C> ... <1C> ... <X><0D>:**
Scrolls a multi-part message from left to right on the bottom line.

INTERFACE TO SOFTWARE USING USB DEVICE NAME

For Non-OPOS application, the application software has to control pole display operation accordingly through the USB device port. To send data to the pole display, the application software has to open and access the device port with device name **\\.\lcd91**. Please see <Sample.c> source code listing for example of using the device name.

The pole display is controlled by command codes and data from the PC. Refer to the Command Set on the left or User Manual for details. Note that as DOS does not support USB, it may not be possible to test the USB pole display with DOS prompt commands. It can only be tested under application software.

GENERAL SPECIFICATIONS

	<u>LD9000U</u>	<u>LD9000XU</u>
OPTICAL:		
Number of rows	2	2 x 2 sides
Number of digits/row	20	20
Dot matrix	5 x 7	5X7
Digit height	0.374in. (9.5mm)	0.374in. (9.5mm)
Digit width	0.244in. (6.2mm)	0.244in. (6.2mm)
Character format	ASCII	ASCII
Brightness (typical)	900 cd/m ²	900 cd/m ²
Display color	Blue-Green	Blue-Green
MTBF (hours)	300,000	300,000
MECHANICAL:		
Weight	2.7 lb.	2.7 lb.
Dimensions (in inches)	(w x h x d)	(w x h x d)
Display head	8.50 x 3.37 x 1.75	8.50 x 3.37 x 2.25
Rectangular base	2.12 x 2.00 x 2.25	2.12 x 2.00 x 2.25
Base plate	4.0 x 0.09 x 8.0	4.0 x 0.09 x 8.0
Overall height (typical)	8 to 25	8 to 25
ELECTRICAL:		
Adapter input power	120VAC, 60Hz; optional 220VAC, 50Hz	
Adapter output power	7.5VAC, 1000mA	
ENVIRONMENTAL:		
Operating temperature	0 to +50 °C	
Storage temperature	-20 to +70 °C	
Relative Humidity	80%, non-condensing	
Vibration (10 to 55 Hz.)	4G's	
Shock	40G's	
CABLES & CONNECTORS:		
USB cable	4-pin Type A USB standard connector	
Power adapter	Phone jack (female)	

Models: LD9000 Series

Customer Displays

2 by 20 character display

USER MANUAL



NOTICE

The manufacturer of the POS pole display makes no representations or warranties, either expressed or implied, by or with respect to anything in this manual, and shall not be liable for any implied warranties of fitness for a particular purpose or for any indirect, special or consequential damages. Information in this document is subject to change without notice and does not represent a commitment on the part of the manufacturer.

FCC NOTICE

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with this manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A digital device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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FEATURES

The LD9000 family of pole displays offers a wide range of high quality features and models to choice from. Listed below are the features incorporated into each pole display. Not all features are available in all models. The model identification chart will assist you in selecting the model best suited to your needs.

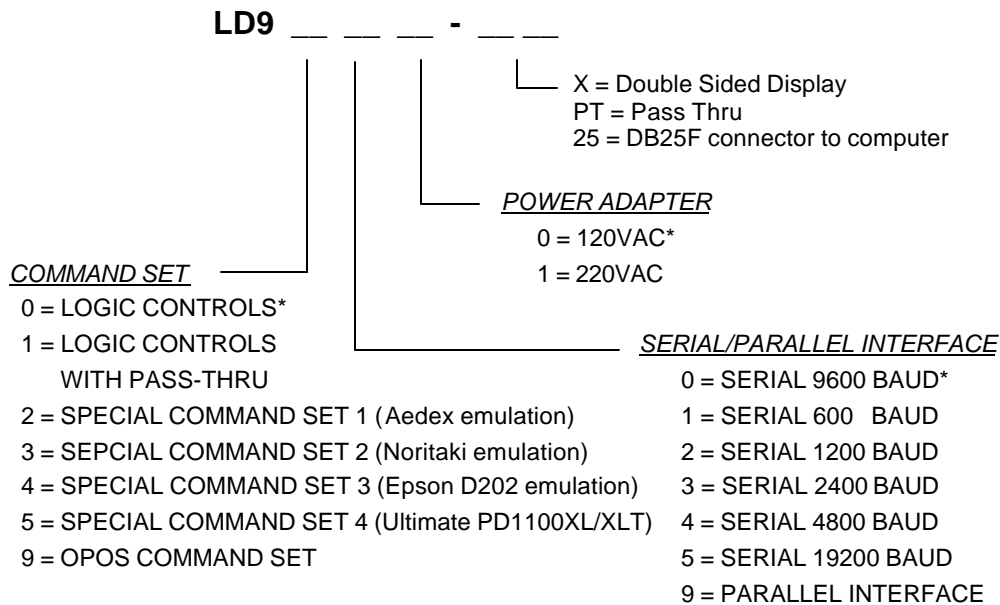
Features - All Models

- Bright blue-green fluorescent display
- Large 9mm character height
- Double sided display available
- Supports high speed serial protocol: up to 19,200 baud rate, 1 stop bit
- Automatic message scrolling
- Two line display with 20 characters per line
- Matched optical lens for better viewing contrast
- Ergonomic design
- Direct RS232C or parallel interface
- Long life and trouble free operation
- Five adjustable viewing angles
- Simple installation
- Available with 120V or 220V Power Adapters

Features - Model dependent

- Emulation of other popular command sets
- Double sided display
- User definable character
- Parallel pass-thru
- True RS232C pass-thru
- Real time clock
- One time message scrolling
- Ability to disable attention code
- Ability to change attention code

MODEL IDENTIFICATION



* Default Values

** Call for description of Command Sets

CARTON CONTENTS

1. Pole display, pre-assembled.
2. Interface cable, comes with a DB9F connector (to computer) and a DIN6F connector (to pole display) as standard equipment. Optional DB25F connector (to computer) is available.

Note: This cable is only supplied with standard serial pole displays with no pass-thru function. Other interface options will have different cables.

3. Transformer adapter 120VAC to 6.0VAC (optional 220VAC).
4. Metal base plate with mounting hardware.
5. Quick Installation Guide.

INSTALLATION

Your PD9000 family of pole displays has been pre-assembled to make the installation as simple as possible.

Serial Interface Non-pass-thru Models Installation

1. Mount the pole display to the metal base plate using the mounting hardware provided.
2. The pole display can be used in a freestanding mode or attached to the counter using the remaining mounting hardware.
3. Connect the round DIN6M connector from the pole display to the round DIN6F connector of the interface cable.
4. Connect the DB9F connector to the computer's serial COM1 or COM2 port.
5. Connect the female phone jack of the power adapter to the male phone jack of the interface cable.
6. Plug the power adapter into a 120VAC outlet.
7. A start up text message (LOGIC CONTROLS POS COMPONENTS) will be present for a short time. When this message disappears the cursor will be displayed at the left-most digit of the top row.

Parallel Interface Non-pass-thru Models Installation

1. Mount the pole display to the metal base plate using the mounting hardware provided.
2. The pole display can be used in a freestanding mode or attached to the counter using the remaining mounting hardware.
3. Connect the DB25M connector to the computer's parallel printer port (LPT1).
4. Connect the female phone jack of the power adapter to the male phone jack of the pole display cable.
5. Plug the power adapter into a 120VAC outlet.
6. A start up text message (LOGIC CONTROLS POS COMPONENTS) will be present for a short time. When this message disappears the cursor will be displayed at the left-most digit of the top row.

Serial Interface Pass-thru Models Installation

- 1 Mount the pole display to the metal base plate using the mounting hardware provided.
- 2 The pole display can be used in a freestanding mode or attached to the counter using the remaining mounting hardware.
- 3 Connect the DB25M connector to the peripheral device or a serial pass-thru terminator (optional accessory). Turn on power of the peripheral device.
- 4 Connect the DB9F connector to the computer's serial COM1 or COM2 port.
- 5 Connect the female phone jack of the power adapter to the male phone jack of the pole display cable.
- 6 Plug the power adapter into a 120VAC outlet.
- 7 A start up text message (LOGIC CONTROLS POS COMPONENTS) will be present for a short time. When this message disappears the cursor will be displayed at the left-most digit of the top row.

Parallel Interface Pass-thru Models Installation

- 1 Mount the pole display to the metal base plate using the mounting hardware provided.
- 2 The pole display can be used in a freestanding mode or attached to the counter using the remaining mounting hardware.
- 3 Connect the DB25F connector to the peripheral device or parallel pass-thru terminator (optional accessory). Turn on power of the peripheral device.
- 4 Connect the DB25M connector to the computer's parallel printer port (LPT1).
- 5 Connect the female phone jack of the power adapter to the male phone jack at the DB25M/DB25F connector.
- 6 Plug the power adapter into a 120VAC outlet.
- 7 A start up text message (LOGIC CONTROLS POS COMPONENTS) will be present for a short time. When this message disappears the cursor will be displayed at the left-most digit of the top row.

FUNCTIONAL TEST

The following test sequence will verify that your pole display is working properly. Before you start this procedure, you must install the pole display correctly as outlined under the INSTALLATION section. The functional test should be done under *MSDOS command prompt* by booting up the computer in DOS mode, or shell out to DOS prompt (in window95/98/ME) or COMMAND prompt (in windows NT/2000).

For double sided displays, the messages will be shown on both sides at the same time.

NOTE: The actual key entries in the text below are enclosed within quotation marks (" "). Do**not** type the quotation marks as part of your entries.

Serial Interface Pole Displays Functional Test

This test procedure assumes the pole display is connected to COM1 of the computer. If COM2 is being used, type COM2 where COM1 is called out.

Close all opened application programs that use the same COM port before going into DOS command prompt. Enter the following command lines to open the COM port for communication with the pole display:

Type "MODE COM1 96,N,8,1" and press the ENTER key.
Type "TYPE CON>COM1" and press the ENTER key.

LD9000, LD9300, LD9400, LD9500 and LD9900

1. Type "ABCDEFGH" and press ENTER key. The display will show "ABCDEFGH" on the first line.
2. To end the test press Ctrl-C (hold down Ctrl and press C).

LD9200

1. Type "!#1ABCDEFGH" and press ENTER key. The display will show "ABCDEFGH" on the first line.
2. To end the test press Ctrl-C (hold down Ctrl and press C).

LD9100-PT, LD9300-PT, LD9400-PT and LD9500-PT

1. Type "ABCDEFGH" and press ENTER key. The display will show "ABCDEFGH" on the first line.
2. Type "^APASSTHRU" (^A is entered as Ctrl-A) and press ENTER key. The data will be passed through to the peripheral (e.g. a printer). These characters are not shown on the display.
3. Type " !#^BNUMBER12345" (^B is entered as Ctrl-B), then press ENTER key. The display will show "NUMBER12345" on the first line.
4. To end the test press Ctrl-C (hold down Ctrl and press C).

LD9200-PT

1. Type " !#1ABCDEFGH" and press ENTER key. The display will show "ABCDEFGH" on the first line.
2. Type "PASSTHRU" and press ENTER key. The data will be passed through to the peripheral (e.g. a printer). These characters are not shown on the display.
3. Type " !#1NUMBER12345", then press ENTER key. The display will show "NUMBER12345" on the first line.
4. To end the test press Ctrl-C (hold down Ctrl and press C).

Parallel Interface Pole Displays Functional Test

This procedure assumes the pole display is connected to the LPT1 port of the computer. If parallel port LPT2 is being used, type LPT2 where LPT1 is called out.

LD9090, LD9390, LD9490, LD9590 and LD9990

1. Type "ECHO ABCDEFGH>LPT1" and press ENTER key. The display will show "ABCDEFGH" on the first line.

LD9290

1. Type "ECHO !#1ABCEDFGH>LPT1" and press ENTER key. The display will show "ABCDEFGH" on the first line.

LD9190-PT, LD9390-PT, LD9490-PT and LD9590-PT

1. Type "ECHO ABCDEFGH>LPT1" and press ENTER key. The display will show "ABCDEFGH" on the first line.
2. Type "ECHO ^APASSTHRU>LPT1" (^A is entered as Ctrl-A) and press ENTER key. The data will be passed through to the peripheral (e.g. a printer). These characters are not shown on the display.
3. Type "ECHO !#^BNUMBER12345>LPT1" (^B is entered as Ctrl-B), then press ENTER key. The display will show "NUMBER12345" on the first line.

LD9290-PT

1. Type "ECHO !#1ABCEDFGH>LPT1" and press ENTER key. The display will show "ABCDEFGH" on the first line.
2. Type "ECHO PASSTHRU>LPT1" and press ENTER key. The data will be passed through to the peripheral (e.g. a printer). These characters are not shown on the display.
3. Type "ECHO !#1NUMBER12345>LPT1", then press ENTER key. The display will show "NUMBER12345" on the first line.

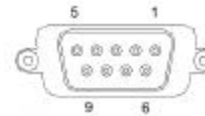
For further testing of OPOS displays (LD9900 and LD9990), follow the instructions in the readme.doc file after software installation.

INTERFACE CONNECTION

Serial Interface Connector Configuration

The pin out configuration for the standard serial pole display is a DB9F connector. It plugs directly into the serial port of the computer.

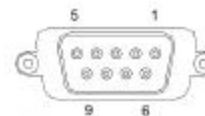
1. DCD (tied to pins 4&6)
2. NC
3. TXD from PC
4. DTR (tied to pins 1&6)
5. Ground
6. DSR (tied to pins 1&4)
7. RTS (tied to pin 8)
8. CTS (tied to pin 7)
9. NC



DB9F (to computer)

For pass-through models, the display cable comes with two connectors. The DB9F is to be connected to the computer while the DB25M is for connection to the peripheral.

1. DCD (tied to pins 4&6)
2. TXD to PC
3. RXD from PC
3. DTR (tied to pins 1&6)
4. Ground
5. DSR (tied to pins 1&4)
6. RTS (tied to pin 8)
7. CTS (tied to pin 7)
8. NC



DB9F (to computer)

1. NC
2. TXD to peripheral
3. RXD from peripheral
4. RTS
5. CTS (tied to pin 20)
6. NC
7. Ground
8. NC
- 9-19 NC
- 20 DTR (tied to pin 5)
- 21-25 NC



DB25M (to peripheral)

Parallel Interface Connector Configuration

All standard parallel pole displays will have a DB25 male connector. It is connected to the printer port of the computer.

- 1. –Strobe
- 2. Data 0
- 3. Data 1
- 4. Data 2
- 5. Data 3
- 6. Data 4
- 7. Data 5
- 8. Data 6
- 9. Data 7
- 10. –Ack
- 11. Busy
- 12-17 NC
- 18-25 Ground



DB25M (to computer)

For pass-through models, the display cable comes with a dual DB25M/F connector. The DB25M is to be connected to the computer while the DB25F is for connection to the peripheral.

- 1. –Strobe
- 2. Data 0
- 3. Data 1
- 4. Data 2
- 5. Data 3
- 6. Data 4
- 7. Data 5
- 8. Data 6
- 9. Data 7
- 10. –Ack
- 11. Busy
- 12. Paper End
- 13. Select
- 14. -Auto Feed
- 15. -Error
- 16. -Initialize Printer
- 17. -Select In
- 18-25. Ground



DB25M (to computer)



DB25F (to peripheral)

SOFTWARE COMMANDS

Logic Controls pole displays are controlled by command codes and data from the computer. The model of pole display that you have will determine which command set works with your pole. Refer to the model identification chart for further information.

Commands are transmitted to the pole display as ASCII codes. The command codes listed below are expressed in hexadecimal (base 16) numbers enclosed inside angle brackets < >, in decimal numbers enclosed in parenthesis (), and in ASCII characters enclosed in curly brackets { }. Do not include the brackets as part of the command. ' ^ ' character denotes ' Ctrl ' in the keyboard. Press and hold ' Ctrl ' , then press the next key.

LOGIC CONTROLS COMMAND SET (LD9000, LD9000-X):

- 1. Vertical Scroll Mode <12>, (18), {^R}:**
Data is written into the second row and transferred to the first row when carriage return is received, leaving the second row empty.
- 2. Normal Display Mode <11>, (17), {^Q}:**
Data can be written into either row. Moves to the left most digit of the other row when line is full.
- 3. Brightness Control <04>, (04), {^D}:**
The brightness of the display can be adjusted using this command followed by a data byte <FF>, <60>, <40> or <20>.
- 4. Back Space <08>, (08), {^H}:**
The cursor position moves one digit to the left erasing the previous information.
- 5. Horizontal Tab <09>, (09), {^I}:**
The cursor position shifts one digit to the right without erasing character at original cursor position.
- 6. Line Feed <0A>, (10), {^J}:**
The cursor position moves to the same position in the other row. In vertical scroll mode, if cursor was in second row, the cursor will not move and display will scroll up.

7. **Carriage Return <0D>, (13), {^M}:**
The cursor moves to the left most digit of the row it is in.
8. **Digit Select <10>, (16), {^P}:**
Moves the cursor to any position on the display with this command followed by a data byte of <00> to <27>, or in decimal (00) to (39).
9. **Cursor On <13>, (19), {^S}:**
Turns on the cursor.
10. **Cursor Off <14>, (20), {^T}:**
Turns off the cursor.
11. **Reset <1F>, (31), {^_}:**
All characters are erased and all settings are returned to the power-on reset conditions.
12. **Down Load Font <03><X> <F> <F> <F> <F> <F>:**
Assign a keyboard key (ASCII code <20> to <7F>) to a different style font. The "X" represents the ASCII code for the selected key. The "F" s represent the 5 segments that will make up the special font.
13. **Message Scroll Left on Top Line
<05><X><X><X> ... <X><0D>:**
Scrolls a continuous message of up to 45 characters from right to left on the top line.
14. **Message Scroll Left on Bottom Line
<1B><06><X><X><X> ... <X><0D>:**
Scrolls a continuous message of up to 45 characters from right to left on the bottom line.
15. **Message Scroll Right on Top Line
<1B><07><X><X><X> ... <X><0D>:**
Scrolls a continuous message of up to 45 characters from left to right on the top line.
16. **Message Scroll Right on Bottom Line
<1B><0B><X><X><X> ... <X><0D>:**
Scrolls a continuous message of up to 45 characters from left to right on the bottom line.

- 17. Both Side Display <1B><0C>, (27)(12), {^[]{^L}:**
After this command, all messages followed are displayed on both sides of double sided displays.
- 18. Front Side Display <1B><0E>, (27)(14), {^[]{^N}:**
After this command, all messages followed are displayed only on front side of double sided displays.
- 19. Back Side Display <1B><0F>, (27)(15), {^[]{^O}:**
After this command, all messages followed are displayed only on back side of double sided displays.
- 20. Clock Display <1B><1A><h><h><3A><m><m>:**
Displays real time clock on bottom line in the 12 hour format hh:mm.
- 21. Smart Message Scroll Left on Top Line
<1B><15><X><X><X> ... <1C> ..<1C> ..<X><0D>:**
Scrolls a multi-part message of up to total of 45 characters from right to left on the top line. Message parts are separated by <1C> and each part must be less than 20 characters.
- 22. Smart Message Scroll Left on Bottom Line
<1B><16><X><X><X> ... <1C> ..<1C> ..<X><0 D>:**
Scrolls a multi-part message of up to total of 45 characters from right to left on the bottom line. Message parts are separated by <1C> and each part must be less than 20 characters.
- 23. Smart Message Scroll Right on Top Line
<1B><13><X><X><X> ... <1C> ..<1C> ..<X><0D>:**
Scrolls a multi-part message of up to total of 45 characters from left to right on the top line. Message parts are separated by <1C> and each part must be less than 20 characters.
- 24. Smart Message Scroll Right on Bottom Line
<1B><14><X><X><X> ... <1C> ..<1C> ..<X><0D>:**
Scrolls a multi-part message of up to total of 45 characters from left to right on the bottom line. Message parts are separated by <1C> and each part must be less than 20 characters.

PASS-THRU COMMAND SET (LD9100-PT, LD9100X-PT):

All software commands of the non-pass-thru single sided model are available with following additional commands for pass-thru and double-sided display control. When power is turned on or after a reset command has been initiated, all text is displayed on the pole display.

Extended Pass-thru Command Set is available as option.

Standard Pass-thru Command Set

- 1. Data to Peripheral <01>, (01), <^A>:**
All data following this command will be sent to the peripheral until a “Data to Display” command is received.
- 2. Data to Display <21><23><02>, (33)(35)(02), {!}{#}{^B}:**
All data following this command will be sent to the pole display until a “Data to Peripheral” command is received.

Extended Pass-thru Command Set

- 1. Data to Peripheral <01><1C><1D><1E>, (01)(28)(29)(30):**
All data following this command will be sent to the peripheral until a “Data to Display” command is received.
- 2. Data to Display <17><18><19><02>, (23)(24)(25)(02):**
All data following this command will be sent to the pole display until a “Data to Peripheral” command is received.

HARDWARE CONFIGURATION

Serial pole displays were factory configured for serial RS232C interface using the following protocol:

- 9600 Baud Rate
- 8 Data Bits
- 1 Stop Bit
- No Parity

Other optional baud rates are available with factory settings. Refer to the model identification chart for further information.

DISPLAY CHARACTER CODES

		D7	0	0	0	0	0	0	0	0	0	0
		D6	0	0	0	0	1	1	1	1	1	1
		D5	0	0	1	1	0	0	1	1	1	1
		D4	0	1	0	1	0	1	0	1	1	1
D	D	D	D									
3	2	1	0		0	1	2	3	4	5	6	7
0	0	0	0	0		DP	SP	0	@	P	‘	p
0	0	0	1	1		DC ₁	!	1	A	Q	a	q
0	0	1	0	2		DC ₂	"	2	B	R	b	r
0	0	1	1	3	DL	DC ₃	#	3	C	S	c	s
0	1	0	0	4	DI M	DC ₄	\$	4	D	T	d	t
0	1	0	1	5	MS		%	5	E	U	e	u
0	1	1	0	6			&	6	F	V	f	v
0	1	1	1	7			’	7	G	W	g	w
1	0	0	0	8	BS		(	8	H	X	h	x
1	0	0	1	9	HT		)	9	I	Y	i	y
1	0	1	0	A	LF		*	:	J	Z	j	z
1	0	1	1	B			+	;	K	[	k	{
1	1	0	0	C	CR		,	<	L	\	l	|
1	1	0	1	D			-	=	M	]	m	}
1	1	1	0	E			.	>	N	^	n	~
1	1	1	1	F		RS T	/	?	O	_	o	

GENERAL SPECIFICATIONS

	<u>LD9000</u>	<u>LD900X</u>
OPTICAL:		
Number of rows	2	2 x 2 sides
Number of digits/row	20	20
Dot matrix	5 x 7	5 x 7
Digit height)	0.374in. (9.5mm)	0.374in. (9.5mm)
Digit width	0.244in. (6.2mm)	0.244in. (6.2mm)
Character config.	ASCII	ASCII
Brightness (typical)	900 cd/m ²	900 cd/m ²
Display color	Blue-Green	Blue-Green
MTBF (hours)	300,000	300,000
MECHANICAL:		
Weight	2.7 lb.	2.7 lb.
Dimensions (in inches)	(w x h x d)	(w x h x d)
Display head	8.50 x 3.37 x 1.75	8.50 x 3.37 x 1.75
Rectangular base	2.12 x 2.0 x 2.25	2.12 x 2.0 x 2.25
Base plate	4.0 x 0.09 x 8.0	4.0 x 0.09 x 8.0
Overall height (typical)	24	24
ELECTRICAL:		
Adapter input power	120VAC, 60Hz; optional 220VAC, 50Hz	
Adapter output power	7.5VAC, 1000mA	
ENVIRONMENTAL:		
Operating temperature	0 to +50 ° C	
Storage temperature	-20 to +70 ° C	
Relative Humidity	80%, non-condensing	
Vibration (10 to 55 Hz.)	4G' s	
Shock	40G' s	
CABLES & CONNECTORS:		
Serial		
Display cable	6-pin DIN (male)	
Interface cable	6-pin Din (female)	
	DB9 (female); optional DB25 (female)	
	Phone jack (male)	
Power adapter	Phone jack (female)	
Parallel		
Display cable	DB25 (female)	

FDU02

*PC Peripheral Type,
USB Fingerprint Recognition Device*

General Description

FDU02 is a Fingerprint Capture Device that supports the USB (Universal Serial Bus) interface and can do hot attachment, Plug & Play and alternate functions. The FDU02 can also support the PS/2 mouse interface and without a specific mouse driver. But for fingerprint sensor functions, the user must install a fingerprint sensor specific driver. The FDU02 uses bulk mode to transfer fingerprint image data and three bulk modes to control the USB interface board. Bulk mode allows multiple devices to be connected to a PC at one time.

Feature

- USB 1.1 compliant
- Supports alternate function
- Supports PS/2 mice Interface
- Supports remote wakeup
- No additional power supply needed (Bus-powered device)
- Immune to electrostatic discharge

Specifications

Supply Voltage:

- Min. 4.75V, Typ. 5.0V, Max. 5.25V

Current Consumption

- SecuGen Hamster III: 60mA (Max)
- SecuGen OptiMouse: 110mA (Max)
- Suspend current: 450uA (Max)

Operating Temperature: 0° ~60° (MAX)

Image Capture Speed: 400ms / frame

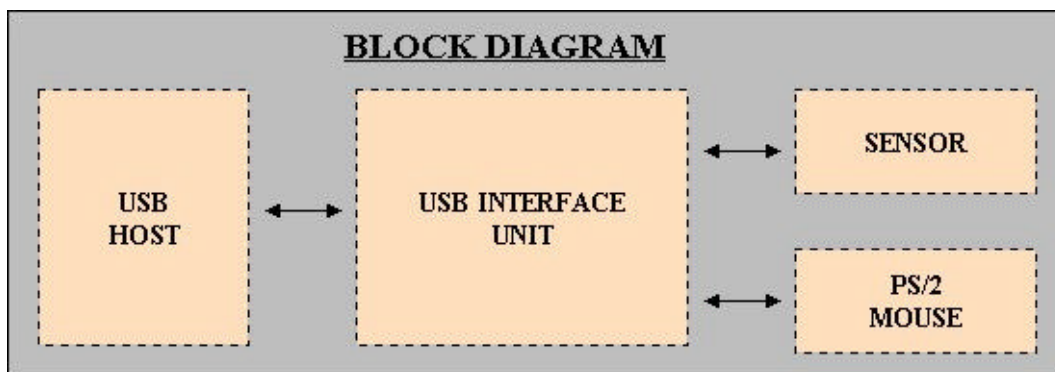
Pixel Resolution: 260 x 300

USB Signal Type:

- USB Spec 1.1, High Speed

Application

- ✓ Fingerprint Recognition Hamster
- ✓ Fingerprint Recognition Mouse
- ✓ Fingerprint Recognition Keyboard
- ✓ Fingerprint Recognition Smartcard
- ✓ Client/Server Solution



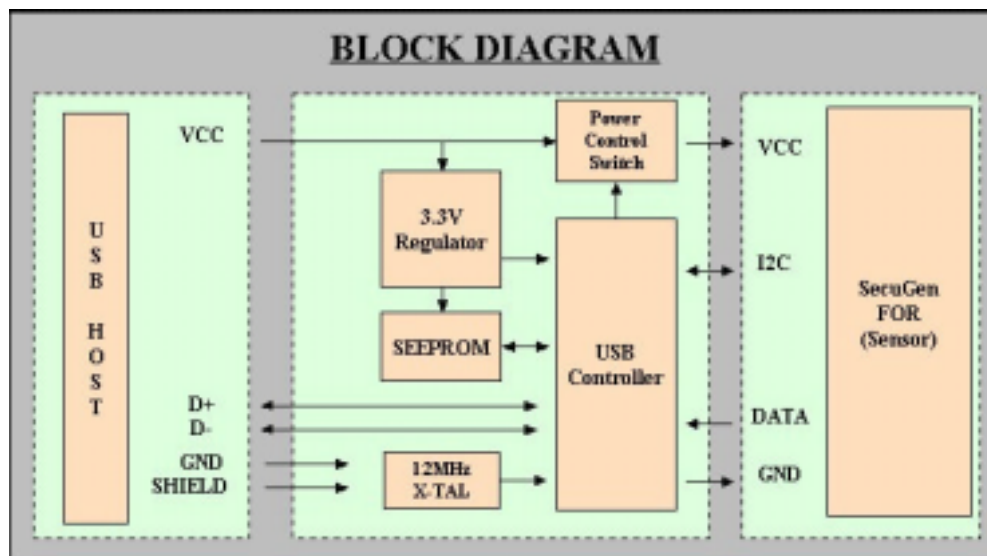
FDU02

*PC Peripheral Type,
USB Fingerprint Recognition Device*

Theory of Operation

The USB host initiates the communication with the FDU02 using operation commands. Fingerprint data are then captured by the CMOS sensor at a total image size of 400 x 300 with 8-bit gray level. The image frame transfer speed is around 800 bytes/ms. It takes about 400 milliseconds to send one complete frame of image data over USB protocols. FDU02 uses the SecuGen Fingerprint Optic Reader. For developers, the SecuGen Software Development Kit (SDK) Collection provides the tools necessary to integrate this module into their own software applications using SecuGen's powerful Fingerprint Recognition Algorithm.

◆ Supports only fingerprint optic recognition function

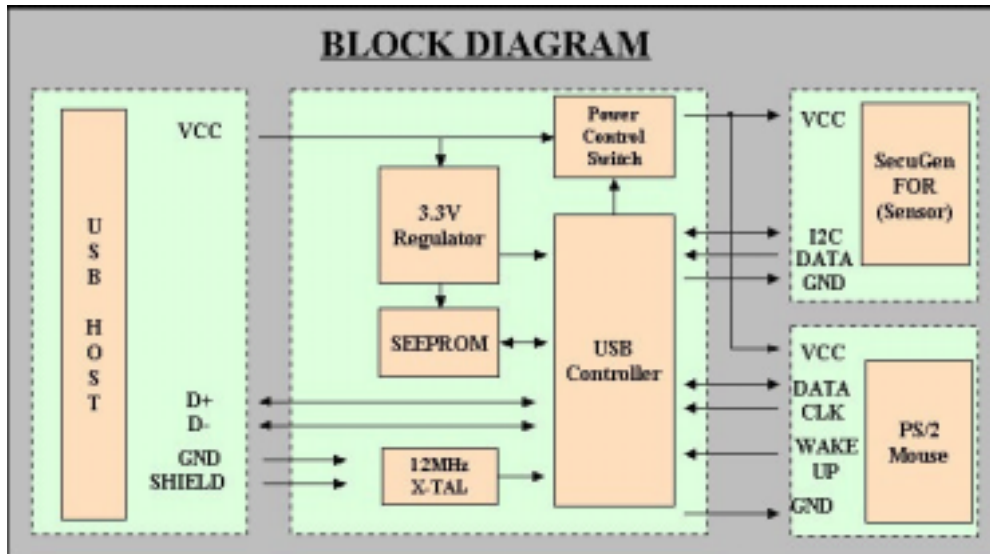


SecuGen FDU02

FDU02

*PC Peripheral Type,
USB Fingerprint Recognition Device*

- ◆ Supports both fingerprint optic recognition and mouse function



SecuGen FDU02

FDU02

PC Peripheral Type,
USB Fingerprint Recognition Device

Connector Pin Description

Name	No	States	Description
GND	1	Power	Sensor Ground
CLK	2	Input	Sensor Clock
SDATA0	3	Output	Sensor Data0
SDATA1	4	Output	Sensor Data1
SDATA2	5	Output	Sensor Data2
SDATA3	6	Output	Sensor Data3
DA	7	Input	Sensor DA
CL	8	Input	Sensor CL
VCC	9	Power	Sensor VCC (DC +5V)

Table 1 JP1 Pin Description

Name	No	States	Description
VCC	1	Power	VCC (DC +5V)
USB_A	2	I/O/Z	USBD -
USB_B	3	I/O/Z	USBD +
GND	4	Power	Ground
SHIELD	5	Power	Shield

Table 2 J1 Pin Description

Name	No	States	Description
GND	1	Power	Ground
PS/2 CLK	2	I/O	PS/2 CLOCK
PS/2 DATA	3	I/O	PS/2 DATA
VCC	4	Power	VCC (DC +5V)
WAKEUP	5	Input	Mouse wake-up
N.C	6	N.C	Reserved
OUT_VCC	7	Power	Controlled VCC (DC +5V)

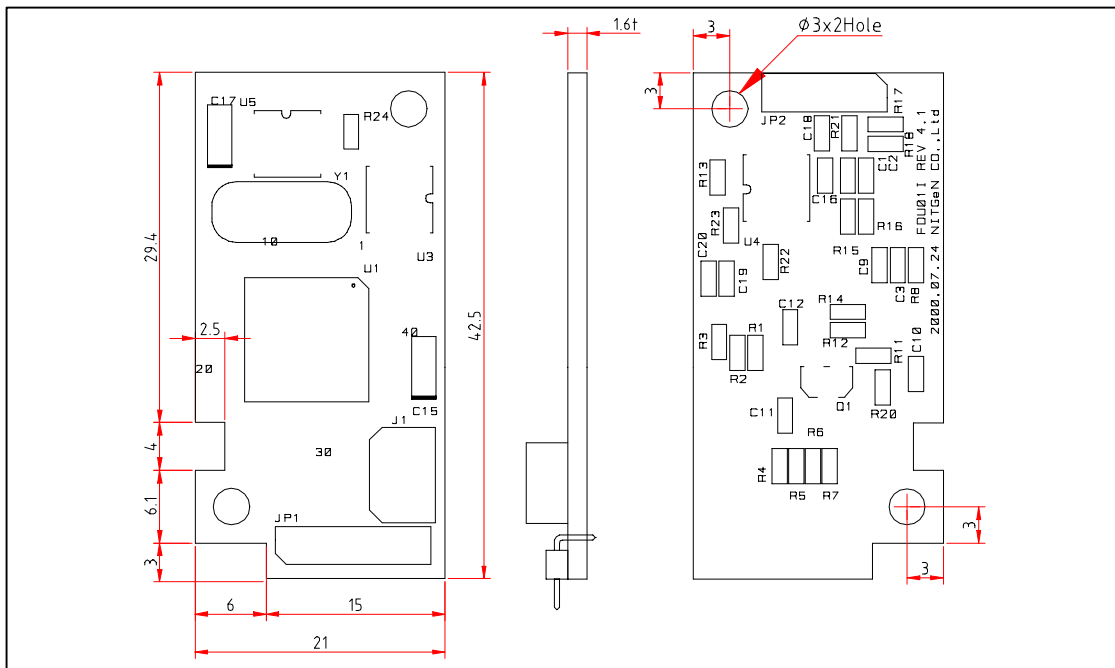
Table 3 JP2 Pin Description

FDU02

PC Peripheral Type,
USB Fingerprint Recognition Device

Outline Dimension

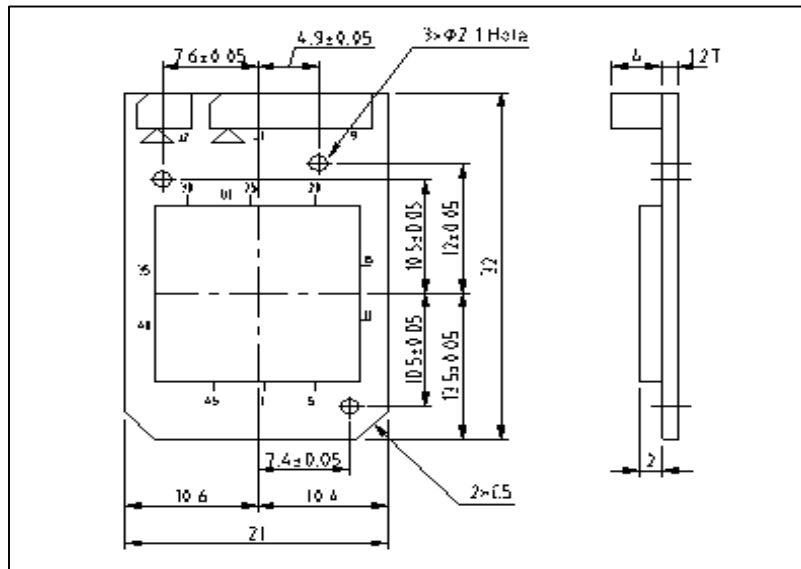
◆ FDU02AI



SecuGen FDU02

**PC Peripheral Type,
USB Fingerprint Recognition Device**

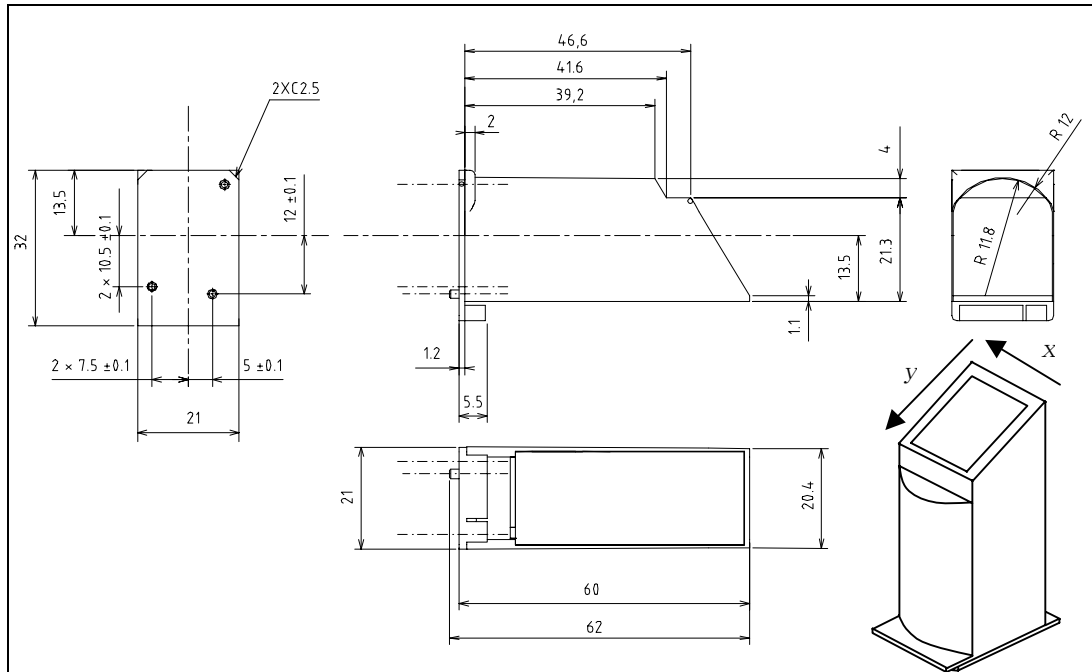
SecuGen FDU02



FDU02

PC Peripheral Type,
USB Fingerprint Recognition Device

Mechanical Dimensions(OPP02M)



SecuGen FDU02

Optical Specification

Hardness of prism surface	750Hk
Resolution	500 ± 10 PPI
Effective Sensing Area	12.7mm (x) x 14.9mm (y)
Effective Pixel Array	400 x 300 (260 x 300 After Correction on X-axis)
Image Aspect Ratio	0.85 (x / y)
Magnification along x-direction	1.00000
Magnification along y-direction	0.641
Non-linear Distortion of Image	<3%
Ambient Light Condition	>5000 Lux

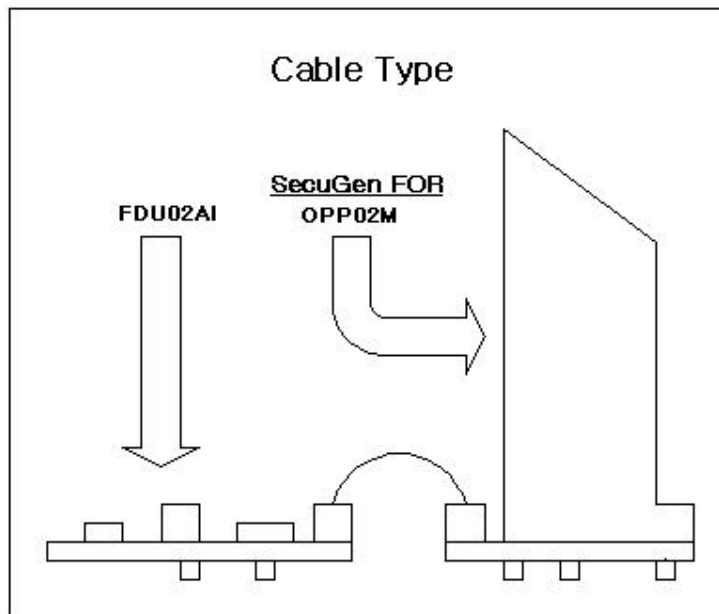
FDU02

*PC Peripheral Type,
USB Fingerprint Recognition Device*

Mounting

◆ Cable connection (Between USB interface and Sensor)

FDU02AI USB interface board (FDU02AI) is cable-connected to the Fingerprint Sensor by a 9-pin cable connection (use the Molex 9 Pin Connector P/N 53048-0910).

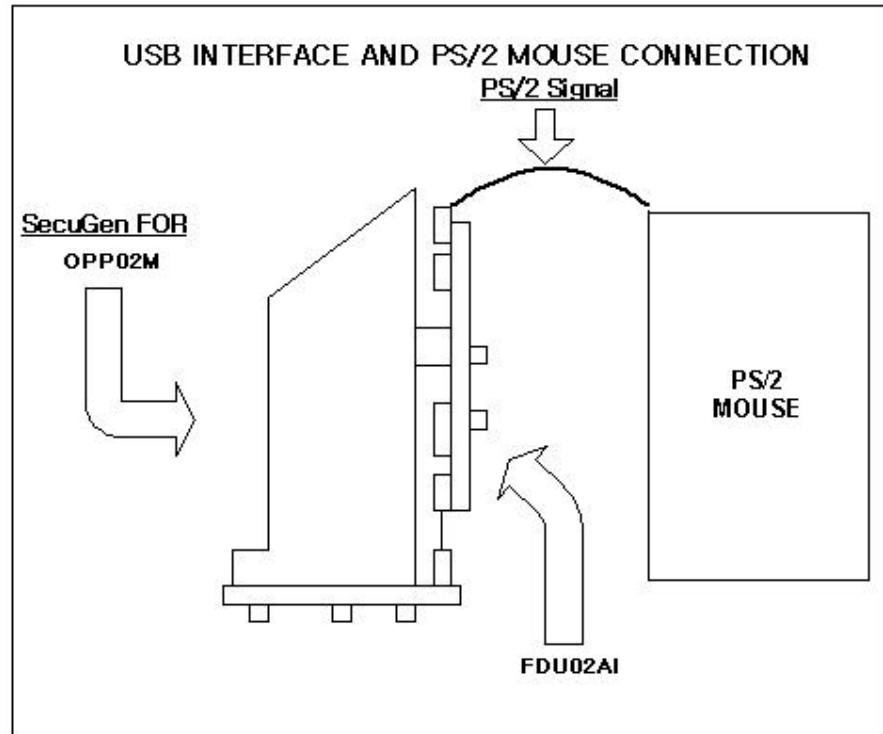


SecuGen FDU02

FDU02

*PC Peripheral Type,
USB Fingerprint Recognition Device*

◆ **Mouse Connection (Between USB interface and PS/2 mouse)**



SecuGen FDU02

FDU02

*PC Peripheral Type,
USB Fingerprint Recognition Device*

Application

◆ **SecuGen Hamster III (HFDU02A)**

SecuGen Hamster III is the name of SecuGen's fingerprint recognition PC peripheral device that uses the FDU02. Using this device is simple and convenient and is used for substituting or enhancing the use of passwords, which are susceptible to theft or are difficult to remember.

This device can support Plug & Play, alternate function and hot attachment. Compared to a computer mouse, this device is small and has an ergonomic, compact design. It can be used for processing fingerprint image data and connect to both bus-powered hubs and self-powered hubs due to its low power consumption.

[Figure 1] SecuGen FDU02A USB



SecuGen FDU02